Solicitation No. W912PP23R0005

Date: April 2023

U.S. ARMY CORPS OF ENGINEERS

New Mexico VA Health Care System
Repair-Replace Elevators in B-41

Albuquerque, NM

RTA
Specifications (Not for construction)

PROJECT TABLE OF CONTENTS

USACE PROVIDED SPECIFICATIONS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 10 00 SOLICITATION, OFFER, AND AWARD, SF 1442; PROPOSAL SCHEDULE, CORPORATE, PARTNERSHIP, JOINT VENTURE CERTIFICATES
00 20 00 INSTRUCTIONS FOR PROCUREMENT
00 21 00 INSTRUCTIONS
00 22 16 SUPPLEMENTARY INSTRUCTIONS TO PROPOSERS
00 45 00 REPRESENTATIONS AND CERTIFICATIONS
00 50 00 CONTRACTING FORMS AND SUPPLEMENTS - Wage Determination
00 70 00 CONDITIONS OF THE CONTRACT

DIVISION 01 - GENERAL REQUIREMENTS

01 30 00 ADMINISTRATIVE REQUIREMENTS
01 33 00 SUBMITTAL PROCEDURES
01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS
01 45 00.00 10 QUALITY CONTROL
01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
01 58 00 PROJECT IDENTIFICATION
01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 78 00 CLOSEOUT SUBMITTALS

DIVISION 02 - EXISTING CONDITIONS

02 82 00 ASBESTOS REMEDIATION
02 83 00 LEAD REMEDIATION

-- End of Project Table of Contents --

SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. W912PP23R0005	2. TYPE OF SOLICITATION ☐ SEALED BID (IFB) ☒ NEGOTIATED *(RFP)*	3. DATE ISSUED 19-Apr-2023	PAGE OF PAGES 1 OF 113

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.

7. ISSUED BY CODE W912PP	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
US ARMY ENGINEER DISTRICT, ALBUQUERQUE 4101 JEFFERSON PLAZA NE ALBUQUERQUE NM 87109-3435 TEL: FAX: 505-342-3496	**See Item 7** TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME DAVID E TERHUNE	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)*

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, Bernalillo County, NM.

This acquisition is an unrestricted (open to both large and small businesses) Lowest Price Technically Acceptable (LPTA) Procurement.

This requirement may be delayed, cancelled or revised at any time during the solicitation process of final award.

Magnitude of construction is between $5,000,000.00 and $10,000,000.00.

Proposals must be submitted in accordance with the requirements in Section 00 22 16. Proposals are due at the time specified in block 13. See Section 00 21 00 pertaining to ProjNet. As this is not a sealed bid, offers will not be opened publicly. Please allow sufficient time for turning in your proposal.

11. The Contractor shall begin performance within 10 calendar days and complete it within 570 calendar days after receiving ☐ award, ☒ notice to proceed. This performance period is ☒ mandatory, ☐ negotiable. *(See* 007000 *.)*

12 A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES," indicate within how many calendar days after award in Item 12B.)* ☒ YES ☐ NO	12B. CALENDAR DAYS 10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 1 copies to perform the work required are due at the place specified in Item 8 by 02:00 PM *(hour)* local time 18May2023 *(date)*. If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee ☒ is, ☐ is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

OFFER ***(Must be fully completed by offeror)***

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NO. *(Include area code)*
	16. REMITTANCE ADDRESS *(Include only if different than Item 14)* **See Item 14**
CODE / FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirements stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS	SEE SCHEDULE OF PRICES

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD ***(To be completed by Government)***

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	**ITEM**	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ☐ 41 U.S.C. 253(c)
26. ADMINISTERED BY CODE		27. PAYMENT WILL BE MADE BY: CODE

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _____ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation, is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)* TEL: EMAIL:	
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

PROPOSAL SCHEDULE
(To be attached to SF 1442)

Item No.	Description	Quantity	Unit	Unit Price	Amount
BASE BID					
0001	Repair Elevators in B-41, Complete	1	JOB	***	$_____
BID OPTION NO.1					
0002	New Cab Enclosures for S2 & S3, Complete	1	JOB	***	$_____

RECAPITULATION

TOTAL AMOUNT - BASE BID	$_____
TOTAL AMOUNT - BID OPTION NO.1	$_____
TOTAL AMOUNT - BASE BID & BID OPTION NO.1	$_____

NOTES:

1. Award of all proposal items will be made to one bidder. Award of Base Bid and Bid Options (if awarded) will be made to one bidder. Bidders must bid on all items.

2. EXERCISE OF OPTIONS. The Contracting Officer may exercise the option by written notice to the Contractor within the performance period listed for the base tasks. Completion of added options shall continue at the same schedule as the Base Bid unless otherwise noted in Section 00 70 00, CONDITIONS OF THE CONTRACT.

3. EVALUATION OF OPTIONS: (FAR 52.217-5) (JUL 1990) Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirements. Evaluation of options will not obligate the Government to exercise the options(s).

(To be attached to SF 1442)

NOTES: (Cont'd)

4. ARITHMETIC DISCREPANCIES:

(a) For the purpose of initial evaluation of bids, the following will be utilized in the resolving arithmetic discrepancies found on the face of bidding schedule as submitted by the bidder:

(1) Obviously misplaced decimal points will be corrected.

(2) Discrepancy between unit price and extended price, the unit price will govern.

(3) Apparent errors in extension of unit prices will be corrected.

(4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purposes of bid evaluation, the government will proceed on the assumption that the bidder intends the bid to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.

5. If a modification to a bid based on unit prices is submitted, which provides for a lump sum adjustment to the total estimated cost, the application of the lump sum adjustment to each unit price in the bid schedule must be stated. If it is not stated, the bidder agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the bid schedule.

6. PROGRESS PAYMENT REQUESTS made by the Contractor pursuant to the provisions of Contract Clause, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS, shall be submitted on ENG FORM 93 to the administration office as designated in Block 26, Standard Form 1442 Back, Solicitation, Offer and Award. ENG FORM 93 shall be submitted to that office on the 1st of each month in appropriate form and certified. Photocopies of the form shall be furnished on that same date to the Corps of Engineers offices designated at the Pre-Construction Conference.

7. ACCRUALS. In accordance with USACE Engineer Financial Regulation (ER) 37-1-30, and other applicable Federal and DOD financial accounting standards, the Contractor must assist government personnel with providing reasonably accurate estimates of the value of goods and/or services rendered to the Government pursuant to this contract for each calendar month during which goods and services are delivered. Standard forms and instructions will be provided by the Government to assist with meeting this requirement. These monthly estimates, which facilitate timely entry of accruals, must be received by the Government on or before four (4) business days prior to each calendar month-end.

PROPOSAL SCHEDULE (Cont.)
(To be attached to SF 1442)

NOTES: (Cont'd)

8. UNIT ABBREVIATIONS

L.S. = LUMP SUM	S.M. = SQUARE METER
L.F. = LINEAR FEET	C.M. = CUBIC METER
S.F. = SQUARE FEET	S.Y. = SQUARE YARD
C.F. = CUBIC FEET	C.Y. = CUBIC YARD

- END OF PROPOSAL SCHEDULE -

Section 00 10 00 - Solicitation

JV/CORP

CORPORATE, PARTNERSHIP, JOINT VENTURE CERTIFICATES

If the offer is submitted by a corporation, partnership or a Joint Venture, the applicable form listed below must be completed and submitted with the Standard Form 1442. In the alternative, other evidence must be submitted to substantiate the authority of the person signing the offer. If a corporation, the same officer shall not execute both the offer and the certificate.

CORPORATE CERTIFICATE

I, _____, certify that I am the Secretary of the corporation named as Offeror/Contractor herein; that _____ who signed this offer/contract on behalf of the Offeror/Contractor was then _____ of said corporation; that said offer/contract was duly signed for and on behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ (CORPORATE SEAL)
(Secretary)

AUTHORITY TO BIND PARTNERSHIP

This is to certify that the names and signatures of all partners are listed below and that the person signing the offer had authority to actually bind the partnership pursuant to its partnership agreement. Each of the partners individually has full authority to enter into and execute contractual instruments, on behalf of said partnership, with the United States of America, except as follows: (State "none" or describe limitations, if any.)

This authority shall remain in full force and effect until such time as the revocation of authority by any cause whatsoever has been furnished in writing to, and acknowledged by, the Contracting Officer.

_____ _____
(Type or Print Name) (Signature)

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Job		
	FY23 VA RNM Elevators FFP Repair / replace elevators in B-41, Raymond G. Murphy Va Medical Center, Bernailillo County, New Mexico FOB: Destination PSC CD: Y1DA				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002 OPTION		1	Jar		
	New Car Enclosures for S-2 and S-3 FFP Provide New Car Enclosures for Service Elevators S-2 and S-3 That Maximize Car Height to 9'-0" FOB: Destination				
				NET AMT	

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	DODAAC / CAGE
0001	N/A	N/A	N/A	N/A
0002	N/A	N/A	N/A	N/A

INSTRUCTIONS TO OFFERORS

THE FOLLOWING ARE INSTRUCTIONS TO OFFERORS TO SECTION 00 20 00:

USE OF THE WORDS "PROPOSER" AND "OFFEROR"

Whenever the word "Proposer" appears in the RFP it shall be construed to have the same meaning as the word "Offeror."

REQUIREMENTS FOR PROTECTING FEDERAL CONTRACT INFORMATION (FCI) AND CONTROLLED UNCLASSIFED INFORMATION (CUI)

Perspective offerors are advised that per current DoD guidance, they are required to comply with FAR 52.204-21, DFARS 252.204-7012, and DFARS 252.204-7020 requirements for safeguarding FCI and CUI for ALL DoD contract awards. In order to be considered for award, contractors are required to complete a cybersecurity assessment in the Supplier Performance Risk System (SPRS), https://www.sprs.csd.disa.mil PRIOR to submitting a proposal. Offerors must be registered in the Procurement Integrated Enterprise Environment (PiEE) in order to access SPRS. Offerors can register for PIEE access at https://piee.eb.mil/piee-landing .

AVAILABILITY OF PLANS AND SPECIFICATIONS

This solicitation will be issued via Internet only. Notification of amendments shall be made via Internet only, as well. It is therefore the contractor's responsibility to check the following address daily for any posted changes to this solicitation. For security reasons, all technical and engineering data related to this solicitation will be distributed using SAM.gov, formerly Federal Business Opportunities (fbo.gov). SAM.gov is a consolidation of ten legacy sites into a single database. In order to save searches, follow contract opportunities, request secure documents or sign up for an Interested Vendor List, you will need a login.gov account in SAM.gov. To create a login.gov account or link an existing login.gov account with SAM.gov follow the instructions on the SAM.gov website. Contractors registered with SAM.gov may view and/or download this solicitation and all amendments from the Internet after solicitation issuance at this site.

BIDDER INQUIRY AND PROPOSAL INFORMATION

a. Technical inquiries and questions relating to proposal procedures or bonds are to be submitted via Bidder Inquiry in ProjNet at **www.projnet.org**.

1. To submit and review bid inquiry items, bidders will need to be a current registered user or self register into the system. To self-register, go to the aforementioned web page and click on the BID tab. Select Bidder Inquiry, select agency USACE, and enter the Bidder Inquiry Key for this solicitation listed below, your email address, and then click login. Fill in all required information and click create user. Verify that information on next screen is correct and click continue.
2. From this page, you may view all bidder inquiries or add inquiry.

2. Bidders will receive an acknowledgement of their question via email, followed by an answer to their question after it has been processed by our technical team.

3. The Solicitation Number is: **W912PP23R0005**
   The Bidder Inquiry Key is: **NYMYCE-JVWA35**

b. The Bidder Inquiry System will be unavailable for new inquires on 11 May 2023 at 2:00PM Mountain time, in order to ensure adequate time is allotted to form an appropriate response and amend the solicitation if necessary.

c. Offerors are requested to review the specification in its entirety, review the Bidder Inquiry System for answers to questions prior to submission of a new inquiry.
d. The call center operates weekdays from 8AM to 5PM U.S. Central Time Zone (Chicago). The telephone number for the Call Center is 800-428-HELP.
e. Offers will NOT be publicly opened. Information concerning the status of the evaluation and/or award will NOT be available after receipt of proposals.

CONTRACTING OFFICER AUTHORITY
The Contracting Officer who signs this contract will be the primary Contracting Officer for this contract. However, any Contracting Officer assigned to the Albuquerque District, contracting within his or her authority, may take formal action on this contract when a contract action needs to be taken and the primary Contracting Officer is unavailable.

NAICS CODE AND SMALL BUSINESS SIZE STANDARD
The North American Industry Classification System (NAICS) code for this acquisition is **238290**. The small business size standard is: the average annual receipts of the concern and its affiliates for the preceding three fiscal years must not exceed **$16.5 million**.
The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

ESTIMATED CONSTRUCTION COST (FAR 36.204)
The estimated magnitude of construction for this project is between **$5,000,000.00 and $10,000,000.00**

WHO MAY SUBMIT PROPOSALS
Any legally organized Offeror may submit a proposal.

Firms submitting a proposal as a joint venture (JV) must ensure the following requirements are met:

a. Obtain a Tax Identification Number (TIN) for the joint venture.
b. Prepare the Section 004500, Representations and Certifications as a joint venture (e.g., providing the TIN for the JV)
c. Register in the System for Award Management (SAM) formerly Central Contractor Registration (CCR) as a joint venture in which a unique CAGE Code will be obtained. See FAR Clause 52.204-7, System for Award Management for further information in Section 002100.
d. Provide a copy of the JV agreement in the proposal submission.

SYSTEM FOR AWARD MANAGEMENT (SAM) REGISTRATION
The Offeror must ensure that your company's data at the System for Award Management (SAM) website, https://www.sam.gov/portal/public/SAM/, is current per FAR 52.204-13, System for Award Management Maintenance. (This clause is included in Section 007000 of this RFP.)

WHO WILL EVALUATE THE PROPOSALS
The Evaluation Committee will be composed of Corps of Engineers and White Sands Army personnel. A list of the members of the committee will not be released and contact with members of the committee is prohibited. Efforts to solicit support from the committee will be considered grounds for disqualification of an Offeror's proposal.

BONDS (FAR 28.102-2)

a. Bid Bond (Each Offeror shall submit with his offer a Bid Bond (Standard Form 24) with good and sufficient surety or sureties acceptable to the Government, or other security as provided in FAR

52.228-1. When the penal sum is expressed as a percentage, a maximum dollar limitation may be stated. The bid bond shall remain in effect until Performance and Payment Bonds are provided and accepted.

b. Performance and Payment Bonds. Within ten (10) calendar days after contract award, and prior to contract performance, the Contractor shall furnish two bonds, a Performance Bond (Standard Form 25) and a Payment Bond (Standard Form 25-A), each with good and sufficient surety or sureties acceptable to the Government. The penal sum of such bonds will be as indicated in FAR 52.228-15.

NEW MEXICO GROSS RECEIPTS TAX (NMGR)
The Offeror should be aware that NMGR tax is applicable to this contract and the rate may vary for each county and city. The Gross Receipts Tax Rate is available from the New Mexico Taxation and Revenue Department, (505) 841-6200. The Gross Receipts Tax Rate is available at http://www.tax.newmexico.gov.

FEDERAL, STATE AND LOCAL TAXES
The Offeror shall include all applicable federal, state and local taxes in the contract price. See FAR 52.229-3, Federal, State, and Local Taxes in Section 007000 for additional information.

PRE-AWARD INFORMATION
Each Offeror shall provide, upon request of the Contracting Officer, a list of present commitments, including the dollar value thereof, and name of office under which the work is being performed.

PERFORMANCE OF WORK BY CONTRACTOR (FAR 36.501)
Unless such description has been submitted with the offer, the successful Offeror must furnish the Contracting Officer within 20 days after award, a description of the work that he intends to perform with his own organization (e.g., earthwork, paving, brickwork, or roofing), the percentage of the total work this represents, and the estimated cost thereof.

U.S. ARMY CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1 AND OSHA REQUIREMENTS

The successful contractor to this Request for Proposals will be required to comply with all pertinent provisions of the latest version of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation. EM 385-1-1 and its changes are available at **http://www.publications.usace.army.mil**. by selecting "Safety and Occupational Health" followed by "EM 385-1-1". The Contractor must also comply with Occupational Safety and Health Act (OSHA) standards. OSHA standards are subject to change. It is the Contractor's responsibility to maintain familiarity with current OSHA standards.

Zero Accident Goal: The Albuquerque District, in its continual pursuit of excellence in safety has established a goal of zero accidents. To attain this goal, it will be necessary for contractor management to set the expectation that worker injury is unacceptable and to create a culture where employees at all levels accept ownership of their safety performance.

AMENDMENTS TO REQUEST FOR PROPOSALS

The right is reserved, as the interest of the Government may require, to revise the specifications and drawings both before and after the date set for receipt of offers. Such revisions, if any, will be announced by amendment(s) to the Request for Proposal. If the revisions and amendments are of a nature which require material changes in quantities, or prices offered, or both, the date set for receipt of offers may be postponed by such number of days as in the opinion of the Contracting Officer will enable the Offeror to revise the offer. In such cases, the amendment will include an announcement of the new date for receipt of offer.

COSTS RELATED TO PROPOSAL PREPARATION

All costs related to proposal preparation, including travel, will be borne solely by the Offeror. The Government is not liable for any costs incurred by the Offeror submitting an offer in response to this solicitation.

CONTRACTOR PERFORMANCE EVALUATIONS

In accordance with the provisions of Subpart 36.201(Evaluation of Contractor Performance) of the Federal Acquisition Regulation (FAR), construction contractor's performance shall be evaluated throughout the performance of the contract. The United States Army Corps of Engineers (USACE) follows the procedures outlined in Engineering Regulation 415-1-17 to fulfill this FAR requirement. For construction contracts awarded at or above $750,000.00, the USACE will evaluate contractor's performance and prepare a performance report using the Construction Contractor Appraisal Support System (CCASS), which is a web-based system. After an evaluation (interim or final) is written up by the USACE, the contractor will have the ability to access, review and comment on the evaluation for a period of 30 days. Accessing and using CCASS requires specific software, called PKI certification, which is installed on the user's computer. The certification is a Department of Defense requirement and was implemented to provide security in electronic transactions. The certification software could cost approximately $110 - $125 per certificate per year and is purchased from an External Certificate Authorities (ECA) vendor. Current information about the PKI certification process and for contacting vendors can be found on the web site: **http://www.cpars.gov/**. If the Contractor wishes to participate in the performance evaluation process, access to PPIRS and PKI certification is the sole responsibility of the Contractor.

OFFEROR'S CHECKLIST

OFFEROR'S CHECKLIST

Administrative Notice to Offerors. Before signing and submitting this proposal, please take note of the following administrative details, as failure to properly perform any one of these actions may cause your proposal to be rejected:

[ ] Have you acknowledged receipt of ALL solicitation amendments? If in doubt as to the number of amendments issued, please contact MAJ David Terhune, Contract Specialist, at david.e.terhune@usace.army.mil.

[ ] Have you completed Section 00 45 00, Representations and Certifications?

[ ] Is your offer in sealed envelopes, price and technical, marked to show the Offeror's name and address, the solicitation number, and the date and time offers are due?

[ ] If any of the solicitation amendments involved changes to the proposal schedule, did you use the amended schedule for submitting your proposal?

[ ] Is your proposal guarantee in the proper form and amount?

[ ] Will your proposal arrive on time? In order for a late proposal to be considered, it must have been dispatched in accordance with the provisions of FAR 52.215-1, "Instructions to Offerors—Competitive Acquisition." **Facsimile proposals will not be accepted**.

[ ] Have you reviewed your proposal for possible errors in calculations or work left out?

Section 00 21 00 - Instructions

CLAUSES INCORPORATED BY REFERENCE

52.204-7	System for Award Management	OCT 2018
52.204-16	Commercial and Government Entity Code Reporting	AUG 2020
52.204-22	Alternative Line Item Proposal	JAN 2017
52.211-2	Availability of Specifications, Standards, and Data Item Descriptions Listed in the Acquisition Streamlining and Standardization Information System (ASSIST)	JUL 2021
52.214-34	Submission Of Offers In The English Language	APR 1991
52.214-35	Submission Of Offers In U.S. Currency	APR 1991
52.215-1	Instructions to Offerors--Competitive Acquisition	NOV 2021
52.215-22	Limitations on Pass-Through Charges--Identification of Subcontract Effort	OCT 2009
52.217-5	Evaluation Of Options	JUL 1990
52.222-5	Construction Wage Rate Requirements--Secondary Site of the Work	MAY 2014
52.225-10	Notice of Buy American Requirement--Construction Materials	MAY 2014
252.204-7019	Notice of NIST SP 800-171 DoD Assessment Requirements	MAR 2022
252.215-7008	Only One Offer	DEC 2022
252.215-7013	Supplies and Services Provided by Nontraditional Defense Contractors	JAN 2023

CLAUSES INCORPORATED BY FULL TEXT

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a Firm, Fixed Price contract resulting from this solicitation.

(End of provision)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
38%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the

goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Bernalillo County, Albuquerque, NM.

(End of provision)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be 20 percent of the bid price or $3 Million, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that

exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of provision)

52.228-17 INDIVIDUAL SURETY--PLEDGE OF ASSETS (BID GUARANTEE) (FEB 2021)

(a) Offerors shall obtain from each person acting as an individual surety on a bid guarantee--

(1) A pledge of assets that meets the eligibility, valuation, and security requirements described in the Federal Acquisition Regulation (FAR) 28.203-1; and

(2) Standard Form 28, Affidavit of Individual Surety.

(b) The Offeror shall include with its offer the information required at paragraph (a) of this provision within the timeframe specified in the provision at FAR 52.228-1, Bid Guarantee, or as otherwise established by the Contracting Officer.

(c) The Contracting Officer may release the security interest on the individual surety's assets in support of a bid guarantee based upon evidence that the offer supported by the individual surety will not result in contract award.

(End of provision)

52.233-2 SERVICE OF PROTEST (SEP 2006)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from

U.S. ARMY CORPS OF ENGINEERS
ATTN: CONTRACTING DIVISION (Contracting Officer, Francesca M. Luna)
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109-3435

(b.) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995) – ALTERNATE I (FEB 1995)

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) An organized site visit has been scheduled for--
Date: May 4, 2023
Time: 9:00am - 11:00am (MST)

(c) Offerors and subcontractors shall register for the site visit AT LEAST THREE (3) BUSINESS DAYS BEFORE the date of the site visit.

(d) Personnel are required to wear masks during site visits if a distance of six (6) feet cannot be maintained between individuals. Contractors must provide their own masks.

(e) Offerors and subcontractors wishing to participate will provide the following information to the Site Visit Registration POCs listed below:
--Visitor Name
--Company Name
--Driver's License number

(f) Site Visit Registration POCs:

POC #1: Jacob Chavez	POC#2: Erin Larivee
Email: jacob.chavez@usace.army.mil	Email: Erin.M.Larivee@usace.army.mil
Phone: (505) 346-7227	Phone: (505) 346-7227 X 7229
Mobile: N/A	Mobile: (505) 231-0052

(g) Participants will meet at Building 56, in the southeast corner of the main campus area of Raymond G. Murphy Dept. of Veterans Affairs Medical Center. Participants will proceed to the Building 41 project site together after signing in and receiving a site visit briefing from the Government representatives at Building 56.

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

https://www.acquisition.gov/browse/index/far

(End of provision)

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (NOV 2020)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any Defense Federal Acquisition Regulation (48 CFR Chapter 2) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

SECTION 00 22 16

SECTION II
(Section 00 22 16 of the RFP)

PROPOSAL SUBMISSION REQUIREMENT, EVALUTATION CRITERIA, AND BASIS FOR AWARD FOR DESIGN BID BUILD FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, BERNALILLO COUNTY, NEW MEXICO.

A. PROPOSAL SUBMISSION

1. GENERAL REQUIREMENTS

1.1 The intent of this Request for Proposal (RFP) is to solicit proposals for FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, BERNALILLO COUNTY, NEW MEXICO. The Government reserves the right to award a contract without discussions in accordance with (IAW) FAR 52.215-1, therefore, the offeror's initial proposal should contain the offeror's best terms from a Management/technical and cost/price standpoint. Offerors shall organize their proposals as described herein. Proposals may be determined non-responsive for failure to follow this format.

1.2 The proposal shall describe the capability of the offeror to perform the requirements of the solicitation. The proposal should be specific and complete in every detail, and should be prepared simply and economically, providing a straightforward and concise description of capabilities to satisfactorily perform the requirements. The proposal should be practical, legible, clear, and coherent.

1.3 In order to evaluate all proposals effectively and equitably, the Contracting Officer must receive information containing sufficient detail to allow review and evaluation by the Government. Proposal clarity, organization, and cross-referencing are mandatory. Failure to submit and organize proposals as requested may adversely affect an offeror's evaluation.

2. PROPOSAL SUBMISSION REQUIREMENTS

2.1 Each volume shall be submitted electronically. There are two electronic options: via email or using the DoD SAFE (formerly AMRDEC SAFE) if proposals are too large to send via email. When using SAFE, offerors are required to request a drop off code from the Contract Specialist, MAJ David Terhune, david.e.terhune@usace.army.mil prior to the proposal due date and time. It is recommended that offerors contact the Contract Specialist, prior to the receipt of proposal date and time, to verify that their

proposal has been successfully submitted, as the DoD SAFE website does not generate a confirmation email.

2.2 Each paragraph shall be single spaced and be separated by at least one blank line. A standard, 12-point minimum font size applies. Arial or New Times Roman fonts are required. Tables and illustrations may use a reduced font size no less than 10-point and may be produced in landscape mode. Sheet size shall be 8.5 x 11 inches, however if drawings, charts, or other graphics are submitted, sheets no larger than 11 x 17 inches shall be used. **Each 11 x 17 page shall count as one (1) single page toward the page count.**

2.3 The following volumes of material shall be submitted:

Volume/Title	Electronic Copies	Page limit
Volume 1: Technical Proposal	One (1)	30*
Volume 2: Price Proposal	One (1)	N/A

Volume	Tab	Title	Digital Copies	Maximum Pages	Rating
1	A	Factor 1: Relevant Contractor Experience	1	20	Acceptable/Unacceptable
1	B	Factor 2: Management Approach	1	10	Acceptable/Unacceptable
1	C	Factor 3: Past Performance	1	N/A	Acceptable/Unacceptable
2		Factor 4: Cost/Price	1	N/A	Not Rated
2	A	Solicitation, Offer and Award Documents, and	1	N/A	Not Rated

		Certifications / Representations			
2	B	Proposal Schedule	1	N/A	Not Rated
2	C	Bid Guarantee (Bid Bond)	1	N/A	Not Rated
2	D	Financials and Financial Standing Questionnaire	1	N/A	Not Rated
2	E	Small Business Subcontracting Plan	1	N/A	Acceptable/Unacceptable
2	F	JV Agreement or Teaming Agreement (if applicable) and/or Corporate, Partnership, Joint Venture Certificate	1	N/A	Not Rated

2.3.1 Past Performance Questionnaires, Representations and Certifications, performance recognition documents, and Small Business Participation Past Performance, are excluded from the page count. Title sheets, indices, a detailed work schedule, and tables of contents are EXCLUDED from the page limitations specified in the tables above.

2.3.2 ***NOTE: Pages that exceed the required page limitations will not be evaluated. Additional pages over the maximum allowed will be removed or not read and will not be evaluated by the Government.***

2.3.3 ***NOTE: A RATING OF UNACCEPTABLE ON ANY FACTOR WILL RESULT IN AN OVERALL RATING OF UNACCEPTABLE.***

3. PROPOSAL FILES

3.1 Format. The submission shall be clearly indexed and logically assembled. Each volume shall be clearly identified and shall begin at the top of a page. All pages of each volume shall be appropriately numbered and identified by the complete company name, date, and Request for Proposal (RFP) number in the header and/or footer. A Table of

Contents should be created using the Table of Content feature in MS Word. MS Word (doc) files shall use the following page setup parameters:

Margins – Top, Bottom, Left, Right – 1”
Gutter – 0”
From Edge – Header, Footer 0.5”
Page Size, Width – 8.5”
Page Size, Height – 11”

3.2 The following additional restrictions apply:

3.2.1 File Packaging. Files shall be in read-only, searchable format, using PDF files.

3.2.2 Content Requirement. All information shall be confined to the appropriate file. The offeror shall confine submissions to essential matters sufficient to define the proposal in a concise manner to permit a complete and accurate evaluation of each proposal. Proprietary information shall be clearly marked.

3.2.3 Where the word “project” appears, it is understood to mean a project(s), contract(s), task order(s), or any other contract document provided for in the Federal Acquisition Regulation (FAR 2.101). Examples of projects submitted by the Prime Contractor may be projects performed for a State or Federal Government Agency, or for a commercial or private sector customer.

B. FACTORS AND EVALUATION APPROACH

VOLUME 1, Tabs A-C Technical Proposal. The volume shall be organized in accordance with the PROPOSAL SUBMISSION REQUIREMENTS and include the following:

1. Factor 1: Relevant Contractor Experience

1.1 SUBMISSION REQUIREMENTS

1.1.1 The offeror shall submit examples of recent construction projects which best illustrate the experience of the construction contractor on relevant projects of similar scope, type, complexity, and magnitude as defined below. **A minimum of three (3) projects, but not more than five (5), are to be submitted for the offeror as the Prime Contractor.** Limit the information for Factor 1 to **twenty (20) pages** or less. If the offeror’s submission exceeds the project limitation of 5 (five) projects, only the first (5) projects submitted will be evaluated, and any remaining additional project(s) will not be evaluated.

1.1.2 Where the word “recent” appears, it is understood to mean construction type project for which construction is at least 70% complete (measured by performance period days) as of the RFP closing date, or a construction type project that has been

completed within 7 years of the RFP closing date. Projects completed more than 7 years before the RFP closing date **will not be considered** for evaluation purposes.

1.1.3 Where the word “relevant” appears, it is understood to mean that project experience submitted is similar to the context of the solicitation in terms of scope, type, magnitude of effort and complexity as described and required in this RFP. For this RFP, “relevant” projects are defined as projects that are similar in terms of:

(a) Renovation or modernization of existing elevator cabs, hoist-ways, machinery spaces, doors, controls, ventilation, life-safety analysis and fire-rated assemblies
(b) Experience with elevator construction in an occupied hospital environment.
(c) Projects involving construction, renovation, or modernization of elevators with a total value at least $3,500,000.
(d) Experience with comprehensive phasing of work in an occupied hospital environment.
(e) Experience with reusable Infection Control Risk Assessment (ICRA) barriers and ICRA Best Practices in Health Care Construction.

Offeror must demonstrate relevant project experience for each of the items (a) through (e) above. Relevant experience can be demonstrated through a combination of the maximum of five (5), minimum of three (3), projects.
All projects submitted for Relevant Contractor Experience must have a project total value of at least $3,500,000.

1.1.4 Information is to be compiled on the Contract Description Forms provided at the end of Section 00 22 16 and will be used to evaluate relevant contractor experience. Responses to this factor should take into account experience of the management team proposed for the contract, timeliness of performance, safety and health record, customer satisfaction and cost control. Projects submitted shall include challenges that were overcome and risks that were mitigated by use of quality management, risk evaluation and mitigation, and technical solutions.

1.1.5 Offerors are invited, but not required, to submit photographs of successful projects in conjunction with this section.

1.1.6 Each project example narrative must include the following information (provided on Contract Description Form):

1.1.6.1 Project and title location

1.1.6.2 Detailed scope of the project

1.1.6.3 Original contract award amount and final construction cost

1.1.6.4 Original contract finish date and actual finish date

1.1.6.5 Points of contact, as described below

1.1.6.6 Subcontractors utilized on the project and if they are proposed to be utilized for this project

1.1.6.7 Prime Contractor personnel on the project and if they are proposed to be utilized for this project

1.1.6.8 Narrative description of the project, as described below:

1.1.7 All project examples shall contain a Point of Contact (POC) as well as on alternate POC, to include the name, job title of the POC, address, telephone, and e-mail address. The POC and alternate shall be familiar with the construction performance of the proposer and be a representative of the owner/customer, not affiliated with the proposer. The POC and alternate shall be available to verify the experience cited.

1.1.8 Narratives for each project should include a brief overview of the project and providing specifics as noted herein, discussing major features of the project and each project's relevance and similarities to this project. The role and work assigned to any sub-contractors and/or personnel noted in the narrative shall be explained.

1.1.9 Indefinite-Delivery, Indefinite-Quantity (IDIQ) Contracts, where numerous Task Orders are summed to meet the minimum construction dollar value identified herein, are not acceptable.

1.1.10 If proposing as a Joint Venture (JV), providing examples for each prime contractor in the JV within the maximum of five (5) project examples is allowed. JV documentation shall be provided in Volume 2 of the offeror's price proposal.

1.1.11 In the case of contractor teaming arrangements involving a prime contractor and subcontractor(s), where the prime contractor submits the proposal in response to this RFP, the prime contractor must have completed at least 2 of the 3 minimum total number of relevant projects submitted for Factor 1 for consideration in response to the experience requirements of the RFP. Teaming documentation shall be provided in Volume 2 of the offeror's price proposal. If a teaming agreement or commitment is not provided, the projects of any team members outside of the Prime Contractor will not be considered.

1.2 EVALUATION CRITERIA

1.2.1 The Government will evaluate the extent of the offeror's experience on projects that are "recent" and "relevant" to the work to be done in the context of this solicitation. Recency and relevancy are defined above. The evaluation will focus on the offeror's experience in construction of facilities similar to this project. **The offeror must submit at least three projects that are determined to be recent and relevant to this project**

as defined in Sections 1.1.2 and 1.1.3 above in order to receive an Acceptable rating for this factor.

1.2.2 The Government preference is that project examples submitted be of completed projects (i.e., construction complete). Projects still under construction will be evaluated only if they are at least 70% complete as of the RFP closing date.

1.2.3 The Offeror MUST, at a minimum, address the requirements listed above. Failure to address these requirements will result in an Unacceptable rating. The Government will evaluate the offeror's understanding of the requirements described in the RFP and associated documents and the capability to execute the project.

2. Factor 2: Management Approach

2.1 SUBMISSION REQUIREMENTS

2.1.1 Provide information that describes the offeror's organization and intended management approach to project management and execution. Limit the information to **ten (10) pages.** At a minimum, the narrative MUST address the key points listed below.

2.1.1.1 Discuss your management approach to successfully complete this construction project. 1) Identify and explain the roles and responsibilities of team members that will perform major or critical aspects of construction phases including lines of authority in decision making. Provide an organization chart identifying on-site and remote positions and staff. 2) Discuss the roles and responsibilities of proposed subcontractors for this project. Identify any experience with local sub-contractors and your approach to managing local workforce.

2.1.1.2 Describe your approach to providing and maintaining an effective Quality Control program for this project to meet contract requirements for onsite construction activities and offsite fabrication. Provide a summary of the Quality Control organization, roles and responsibilities of key positions, and a summary level plan to meet the project's Quality Control requirements. Offerors are cautioned that reciting of the Technical requirements with a statement of intent to perform does not reflect an understanding of the requirement or capability to perform. Offerors are responsible for including sufficient details to permit complete and accurate evaluation of each proposal.

2.1.1.3 Describe your approach to phasing of work to execute the project in an occupied VA Medical Center.

2.1.1.4 Describe manufacturing, technical support, and production facilities available to support the execution of this project.

2.2 EVALUATION CRITERIA

2.2.1 The Offeror MUST, at a minimum, address the requirements listed above. Failure to address all requirements will result in an Unacceptable rating. The Government will evaluate the offeror's understanding of the requirements described in the Division 01 of the RFP in addition to any/all plans and specifications of the RFP and the capability to execute the project.

3. **Factor 3 – Past Performance**

3.1 SUBMISSION REQUIREMENTS

3.1.1 Information provided on the Contract Description Forms provided under Factor 1: Relevant Contractor Experience will be used to evaluate Past Performance.

3.1.2 Past Performance Questionnaire (PPQ).

3.1.2.1 For each of the projects submitted in response to Section 1.1, provide a Contractor Performance Assessment Reporting System (CPARS) evaluation, or a completed Past Performance Questionnaire (PPQ), completed by a representative of the owner that provides the owner's opinion of the offeror's past performance for the project. As an alternative to a CPARS evaluation, or when CPARS evaluations do not apply, the Past Performance Questionnaire included in this solicitation (at the end of Section 00 22 16) is provided for the offeror or its team members to submit to the customer/client for each project the offeror includes in its proposal for the Past Performance factor. The offeror shall complete Part I of the Past Performance Questionnaire and e-mail the questionnaire to both the contracting activity and technical representative (Government or otherwise) responsible for the past/current contract. The POCs shall be instructed to electronically complete Part II of the questionnaire. Ensure correct phone numbers and email addresses are provided for the customer/client point of contact.

3.1.2.2 Completed PPQs should be submitted with your proposal. If the offeror is unable to obtain a completed PPQ from a customer/client for a project before the proposal closing date, the offeror should complete and submit with the proposal the first page of the PPQ which will provide contract and customer information for the respective project(s). Offerors should follow up with customers/clients to ensure timely submittal of questionnaires. The Government reserves the right to contact the customer/client for verification or additional information. If the customer requests, questionnaires may be submitted directly to the Contracting Office no later than the proposal due date via email. Contact, MAJ David Terhune, Contract Specialist, via email at David.e.terhune@usace.army.mil.

3.1.2.3 Offerors shall not incorporate by reference into their proposal PPQs previously submitted for other RFPs. i.e., offerors cannot reference PPQ's from other projects by simply stating "refer to PPQ submitted for Project XX". Complete PPQs must

be submitted for this project. However, this does not preclude the Government from utilizing previously submitted PPQ information into the past performance evaluation.

3.1.2.4 Submit copies of Federal/DoD/Navy/Army performance reviews even if they may be in the agency's databases or likely within the agency's arm's reach, i.e., Contractor's copy of CPARS evaluations for each of the projects submitted, to ensure the agency has all relevant past performance information.

3.1.2.5 Provide the Unique Entity Identification number(s) and CAGE code(s) for the prime contractor and all teaming partners, e.g., design firms, key subcontractors, and joint venture partners, whose experience is included in this Factor.

3.1.2.6 The Government may contact and interview the owner's representative identified on the Past Performance Questionnaires and reserves the right to interview other individuals acting for the owner's representative if the owner's representative is not available. In addition, the Government may review any other sources of information for evaluating past performance.

3.1.2.7 Offerors may include performance recognition documents received within the last seven (7) years, from RFP closing date, such as awards, award fee determinations, customer letters of commendation, and any other forms of performance recognition relative to the projects submitted for this factor. The Government may review other sources, including, but not limited to, past performance information retrieved through the Past Performance Information Retrieval System (PPIRS), including Contractor Performance Assessment Reporting System (CPARS), using all CAGE/DUNS numbers of team members (partnership, joint venture, teaming arrangement, or parent company/subsidiary/affiliate) identified in the offeror’s proposal, inquiries of owner representative(s), Federal Awardee Performance and Integrity Information System (FAPIIS), Electronic Subcontract Reporting System (eSRS), and any other known sources not provided by the offeror.

3.1.2.8 While the Government **may** elect to consider data from other sources, the burden of providing detailed, current, accurate and complete past performance information rests with the offeror.

3.1.2.9 Other types of past performance questionnaires, signed by a commercial customer or signed by a representative from another Federal or State agency, may be submitted as long as the information submitted has the same or similar information as that of the PPQ provided at the end of this section, documenting the quality of the offeror’s performance for the project submitted.

3.1.2.10 PPQs previously completed by the customer/client may be submitted in lieu of having the customer/client complete a new questionnaire for the contracts identified in the Contract Descriptions Form. Previously completed surveys will be evaluated only if: (1) they match the projects identified in Volume I Tab A **and** (2) they are submitted according to the instructions listed above.

3.1.2.11 Small Business Participation Past Performance. All offerors shall submit information substantiating the offerors' past performance in complying with FAR 52.219-8, Utilization of Small Business Concerns, maximizing opportunities for U.S. small business subcontractors. Offerors may submit ISRs/SSRs as part of their past performance. Offerors shall also provide a statement indicating whether any negative information has been reported in the past seven years concerning the offerors' past compliance with FAR 52.219-8 and FAR 52.219-9 (large businesses only). If any such negative information has been reported, the offeror may submit explanations or comments responding to such negative information. Offerors with no prior contracts containing FAR 52.219-8 and 52.219-9 (large businesses only) shall certify the same. In evaluating past performance, the Government reserves the right to review any ISRs/SSRs in the eSRS, not provided in the offeror's proposal.

3.1.2.12 If an offeror has been required to take corrective action for any substandard performance (overall rating below Satisfactory), the offeror should explain the circumstances and the corrective actions taken. If an offeror has experienced other performance problems such as cost overruns, extended performance periods, numerous warranty calls, etc., the offeror should provide an explanation of the reason(s) for the shortcomings and any corrective action(s) taken to avoid recurrence.

3.1.2.13 At no time during this process, during any debriefing, or after any award, will the names of the individuals providing reference information about an offeror's past performance be revealed to the offerors or to any other party. If discussions are held, Offerors may be afforded the opportunity to respond to adverse comments made by references in accordance with guidelines identified in FAR Part 15.3. In this case, relevant comments will be extracted and provided to the offeror.

3.2 EVALUATION CRITERIA

3.2.1 The Offeror shall submit either a CPARS evaluation or PPQ for each of the projects submitted for Factor 1: Experience. The Government will evaluate the Offeror's record of past and current performance to ascertain the probability of successfully performing the required efforts of the contract. Information provided on the Contract Description Forms provided under Factor 1: Relevant Contractor Experience will be used to evaluate Past Performance.

3.2.2 The Government will focus its inquiries on the record of performance as it relates to all solicitation requirements, including cost, schedule, performance and management of subcontractors *and compliance with FAR 52.219-8, Utilization of Small Business Concerns, and FAR 52.219-9, Small Business Subcontracting Plan.* A significant achievement, problem, or lack of relevant data in any element of the work can become an important consideration in the evaluation process. Absent any recent and relevant past performance history, the offeror shall be determined to have unknown (or "neutral") past performance. In the context of acceptability/unacceptability, a neutral rating shall be considered Acceptable. In making its assessment, the Government may use data provided by the offeror in its proposal and data obtained from other sources, including data in Government files or data obtained through interviews with personnel familiar with the contractor, and any other information relating to their current and past performance under Federal, State or Local government or commercial contracts.

3.2.3 The past performance factor is an assessment of the offeror's probability of successfully performing this contract. This assessment considers each offeror's demonstrated recent and relevant record of performance in supplying products and services that meet the contract requirements. The contractor must have an overall Past Performance rating of no less than "Satisfactory" on a majority of the projects submitted for this factor. Negative Past Performance may be considered by the Government as an indicator of increased risk of unsuccessful performance on this contract. As such, the Contracting Officer may determine that an Unacceptable rating for Past Performance is merited for offerors who demonstrate a trend of negative Past Performance.

3.2.3.1 Past performance is initially evaluated to determine whether the offeror's present/past performance is recent, and relevant or not relevant to the effort to be acquired.

3.2.3.2 RECENCY: The first aspect is to evaluate the recency of the offeror's past performance. Recency is generally expressed as a time period during which past performance references are considered relevant and is critical to establishing the relevancy of past performance information. (Seven (7) years as of the RFP closing date.)

3.2.3.3 RELEVANCY: The second aspect is to determine how relevant a recent effort accomplished by the offeror is to the effort to be acquired through the source selection. Relevancy is not separately rated; however, the following criteria (see Table 1) will be used to establish what is relevant which shall include items such as similarity of service/support, complexity, dollar value, contract type, and degree of subcontract/teaming.

Table 1- Past Performance Relevancy Ratings	
Rating	**Definition**

Relevant	Present/past performance effort involved similar scope and magnitude of effort and complexities as this solicitation requires.
Not Relevant	Present/past performance effort involved little or none of the scope and magnitude of effort and complexities as this solicitation requires.

3.2.4 Past Performance Evaluation Rating: Past performance information collected will be reviewed to determine how well the offeror performed on prior contracts. Utilizing the Performance Evaluation Ratings (see Table 3 below) the most appropriate rating for each Offeror will be assigned based on the Offeror's demonstrated recent and relevant record of performance.

4. VOLUME 2, Tabs A-F – Cost/Price.

4.1 The volume shall be organized in accordance with the PROPOSAL SUBMISSION REQUIREMENTS and include the following:

4.1.1 Electronic Copy. The Offeror shall provide a completed Proposal Schedule from Section 00 10 00 of the RFP.

4.1.2 Compliance. Failure to comply with the RFP requirements for Cost information may result in an adverse assessment of an offeror's proposal and reduce or eliminate its chance of being selected for award. Offerors shall ensure that the information presented in this volume is consistent and correlates with the information contained in the other proposal volumes. Also, the Offeror shall ensure that the information submitted in this volume is consistent with and fully supports the amounts set forth in the SF1442 and continuation sheets.

4.1.3 General Instructions. In accordance with Federal Acquisition Regulation (FAR) 15.402 and 15.403-1, certified cost or pricing data are not required based on the fact that adequate competition is expected for this procurement. Information other than certified cost or pricing data may be provided in contractor format providing that sufficient information is made available. Information submitted shall be prepared following the instruction in FAR 15.403-5. If after receipt of proposals the Contracting Officer determines that there is insufficient information available to determine price reasonableness and none of the exceptions at FAR 15.403-1 apply, the Offeror may be required to submit cost or pricing data. Additionally, in the event that adequate competition is not obtained, the Contracting Officer may incorporate FAR 52.215-20 entitled, "Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data," into the solicitation and request a Certificate of Current Cost or Pricing Data. There are no page limitations for this volume. Proposal information included in this volume which is not directly related to Cost will be disregarded.

4.1.4 Proposal Cover Sheet. Offerors shall include a proposal cover sheet in Volume 2 as required by FAR 52.215-1(c)(2). This provision, entitled “Instructions to Offerors – Competitive Acquisition,” is included in full text in Section 00 21 00 of the RFP. The proposal cover sheet must provide the following information:

4.1.4.1 Solicitation Number

4.1.4.2 Name, address, telephone, and electronic email address

4.1.4.3 Unique Entity Identification number, CAGE, and Tax Identification numbers of the Offeror

4.1.4.4 Statement specifying the extent of the agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item as reflected in the price schedule attached to the SF1442. (Note: failure to agree with all terms, conditions, and provisions in the solicitation may result in the Offeror’s proposal being rejected as non-responsive).

4.1.4.5 Name, title, telephone, and electronic email address of person(s) authorized to negotiate on the Offeror’s behalf with the Government in connection with this RFP.

4.1.4.6 Name, title, telephone, and electronic email address of person(s) authorized to sign the proposal and any contract that may result from the proposal.

4.1.4.7 Name, title, telephone, and electronic email address of alternative point of contact (other than those listed in 7.4.5 and 7.4.6 above) authorized to receive electronic correspondence regarding this RFP.

4.1.4.8 Acknowledgement that your company’s data at the System for Award Management website is current per FAR 52.204-7, System for Award Management. This clause is included in Section 00 70 00 of this RFP.

4.1.5 Following the proposal cover sheet, Volume 2 should be organized into the following tabbed sections:

4.1.5.1 Standard Form, Solicitation, Offer and Acknowledgement of Amendments (SF1442). If hard copies are submitted, these documents should be secured within some form of document protector and not “hole punched”. The SF1442 shall be completed by the Offeror and duly executed with an original signature by an official authorized to bind the company in accordance with instruction at FAR 4.102. Include with the Offeror’s name and address in Block 14 of the SF1442, your company’s DUNS, CAGE, and Tax Identification

numbers. Offerors shall acknowledge all amendments to the solicitation in block 19. If the Offeror fails to acknowledge all amendments, the proposal (Volumes 1 and 2) will be considered non-responsive and shall not be evaluated further.

4.1.5.2 Proposal Schedule. Your proposed price for this project shall be in the form of the Proposal Schedule provided in the solicitation. **Offerors may not modify the proposal schedule wording or format.** As this is a firm, fixed price contract, price proposals will not be considered which provide for subsequent increases in price. No qualified price proposal of any type will be accepted; therefore, all offers containing such qualifications will be considered unacceptable. If the Offeror does not comply with all requirements of the proposal forms, the proposal may be considered unacceptable and eliminated from consideration.

4.1.5.3 Bid Guarantee/Bond (SF24). This tab shall contain an executed bid bond for either 20% or $3 Million, whichever is less. The hard copy documents that will be mailed in should be secured within some form of document protector and not “hole-punched.” Failure to furnish a bid bond in proper form and amount in your Price Proposal may result in the offeror’s proposal being rejected from further consideration.

4.1.5.4 Certifications/Representations and other Statements of Offerors. This tab shall contain Section 00 45 00 of this solicitation, including the Representation & Certifications cover page completed by the Offeror (to include provision 52.204-26 Covered Telecommunications Equipment or Services). Complete all provisions and fill in all applicable areas. In addition, Offerors shall include in this tab their completed electronic Representations and Certifications from the SAM.gov website. Since FAR 52.204-7 System for Award Management is applicable to this solicitation, the offeror in accordance with FAR 52.204-8 (d) is required to complete the annual representations and certifications electronically via the SAM Web site accessed through https://www.sam.gov. After reviewing the SAM database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified by the offeror under this provision.

4.1.5.5 Financials and Financial Standing Questionnaire. Offerors shall provide their latest balance sheet and income statement, including names of banks or other financial institutions with which your firm conducts business. If the financial statements are more than 60 days old, a certificate should be attached stating that the financial condition is substantially the same, or if not the same, state the changes that have taken place. The financial statements will be treated

as confidential. The Financial Standing Questionnaire provided at the end of this section of the RFP is required to be submitted under this section.

4.1.5.6 Small Business Subcontracting Plan. Only large business Offerors are required to submit a subcontracting plan. The plan shall be prepared in accordance with FAR 52.219-9 (DEV), DFARS 252.219-7003, and AFARS Appendix DD. The Offeror shall take into consideration when preparing the required subcontracting plan, that only those subcontracts which are awarded directly by the prime contractor to small and small disadvantaged firms can be included in the plan. Subcontracts to be awarded by a large business subcontractor are subject to the flow-down provisions of the clause and shall be reported by that subcontractor electronically via eSRS (https://www.esrs.gov). Failure to submit an acceptable subcontracting plan shall make the Offeror ineligible for the award of the contract. The format for the subcontracting plan and subcontracting goals applicable to this solicitation are provided at the end of section 002216. Subcontracting plans will be evaluated on an ACCEPTABLE/UNACCEPTABLE basis. The Subcontracting Plan must adequately respond to each of the required elements of FAR 52.219-9(d) paragraphs (1) through (15).

4.1.5.7 JV Agreement and/or Corporate, Partnership, Joint Venture Certificate. If applicable, the offeror shall provide a copy of the firm's JV Agreement. The offeror shall provide a completed copy of the Corporate Partnership, Joint Venture Certificate provided in the RFP.

4.1.5.8 Teaming Agreement. If utilizing a Teaming Arrangement, as part of your proposal, the offeror must provide a contractor team agreement signed by all parties, identifying the legal name(s) of all entities, and describing the nature of each entity's relationship (teaming/partnering, joint venture, mentor/protégé, etc.)

4.2. FACTOR 4: COST/PRICE FACTOR. Adjectival ratings shall not be used for offerors' Cost/Price proposals. The Government will fully evaluate and, if necessary, negotiate all priced Contract Line Item Numbers (CLINs) for award. For award purposes, the total proposed price for all CLINs will be added together into a total sum (contract value). The evaluation of all option CLINs will not obligate the Government to exercise any option.

4.2.1 The Offeror's Cost/Price proposal will be evaluated as follows.

4.2.1.1 FFP Evaluation. For a price to be fair and reasonable, it must represent a price to the Government that a prudent person would pay in the conduct of competitive business. The Offeror's proposed fixed-price CLINs may be evaluated, using one or

more of the techniques described in FAR 15.404-1 in order to determine if they are fair and reasonable.

4.2.1.2 Overall Cost/ Price Proposal Evaluation: The overall Cost/Price proposal will be evaluated for the following:

4.2.1.2.1 Compliance: The Cost/Price proposal submitted by the Offeror will be evaluated for compliance based upon the submission requirements contained in this Section 00 22 16, Volume 2-- Cost/Price instructions.

4.2.1.2.2 Errors: The Offeror's Cost/Price proposal will be reviewed for errors. The Offeror may be given an opportunity to clarify certain aspects of their proposal at the sole discretion of the Contracting Officer.

4.2.1.2.3 Total Evaluated Price: The Total Evaluated Price consists of summing the Offeror's proposed fixed-price CLIN prices for the base bid and any/all optional CLINs.

C. BASIS FOR AWARD

1.1 Proposals must meet the criteria stated in the RFP in order to be eligible for award, to include responsiveness, technical acceptability, and responsibility.

1.2 The Government intends to award without discussions based on the initial proposals received, therefore, the proposals shall contain the Offeror's best terms from a cost and technical standpoint. However, the Government reserves the right to conduct discussions in accordance with FAR 52.215-1 if the discussions are deemed necessary at the Government's discretion. The Government reserves the right to address any pertinent issues in the proposals.

1.3 The award will be made to the lowest priced technically acceptable proposal. Proposals will be evaluated for technical acceptability (including past performance) but will not be ranked using the non-price Factors (and Subfactors). In order for an Offeror to be considered for award, the proposal **must** receive an "Acceptable" rating in every non-price Factor. A proposal receiving a rating of "Unacceptable" in any non-price Factor will not be eligible for award. Additionally, any other than small business offeror must have an acceptable Small Business Subcontracting Plan to receive an award in accordance with Federal Acquisition Regulation (FAR) 19.702(a).

2. EVALUATION

2.1 Each member of the Source Selection Evaluation Board (SSEB) will independently consider all information provided in the technical proposal (non-priced factors). Once these individual analyses are completed, the team will meet and

determine a rating for each of the evaluation Factors by consensus decision. The evaluation team will document their decision to support the rating for each Factor.

2.2 The Past Performance Factor considers each Offeror's demonstrated record of performance as explained in more detail above in Factor 3. The past performance evaluation will consider recency (within 7 years from RFP closing date) and relevancy (similar scope, type, magnitude) of the projects submitted as well as trends in the Offeror's performance record.

2.3 Past Performance information will be reviewed to determine the quality of the Offeror's performance, general trends, and usefulness of the information and incorporate these into the evaluation rating.

2.4 The Government will evaluate the offeror's probability of meeting the minimum past performance solicitation requirements and prior compliance with FAR 52.219-8 Utilization of Small Business Concerns and FAR 52.219-9 Small Business Subcontracting Plan (if applicable). The Government will utilize the rating descriptions outlined below (see Table 3 to evaluate Past Performance).

2.5 Documentation and comments are required for all ratings. This consensus rating will be provided to the Source Selection Authority who, independently exercising prudent business judgment, will select the most qualified Contractor.

3. DEFINITIONS:

3.1 Rating. The adjective descriptor assigned by the evaluators to the non-Cost/Price Factors. It represents their conclusions as to the contractor's ability to meet the minimum standards of acceptability.

3.2 Factor Rating Definitions.

3.2.1 Technical Rating. In accordance with the Army Source Selection Supplement (AS3), Appendix A, the Army methodology for evaluating Technical Factors is to assign a rating of Acceptable or Unacceptable to each factor (see Table 2 below). Proposals are evaluated for acceptability, but not ranked using the non-cost/price factors. The Government will assess whether the offeror's proposal will satisfy the Government's minimum requirements.

Table 2: Technical Ratings

TECHNICAL ACCEPTABLE/UNACCEPTABLE RATINGS	
Rating	**Definition**
Acceptable	Proposal meets the requirements of the solicitation.
Unacceptable	Proposal does not meet the requirements of the solicitation.

3.2.2 Past Performance Rating. The adjectival ratings below will be used to rate non-

priced Factor 3, Past Performance.

Table 3: Past Performance Evaluation Ratings	
Rating	**Definition**
Acceptable	Based on the offeror's performance record, the Government has a reasonable expectation that the offeror will successfully perform the required effort, or the offeror's performance record is unknown.
Unacceptable	Based on the offeror's performance record, the Government does not have a reasonable expectation that the offeror will be able to successfully perform the required effort.

D. DISCUSSIONS

1.1 GENERAL INFORMATION. In accordance with FAR 15.306(d), discussion sessions with each offeror may be held. Should discussions take place, all offerors in the competitive range will be notified and allowed to submit Final Proposal Revisions if discussions require such revisions.

1.2 DISCUSSION SCHEDULING. If discussions are conducted, the Contracting Officer will schedule the discussion sessions, and each offeror will be notified. The Contracting Officer will provide additional instructions with the notification.

END OF SECTION

SUBCONTRACTING PLAN INFORMATION FOR VOLUME 2, TAB E

Contractor shall provide detailed explanations/documentation supporting the proposed subcontracting goals. All proposed socioeconomic goals shall be substantiated with the Offeror's supported market research. Proposing only the minimum Department of Defense Office of Small Business Programs statutory goals, without providing substantiated market research may result in an Unacceptable rating. Please note that in accordance with DFARS 219.705-4 the minimum subcontracting requirement to Small Disadvantaged Businesses is 5.0%.

1. SUBMIT YOUR PLAN IN THE ATTACHED FORMAT

2. Subcontracting Plans will be evaluated in accordance with FAR Clause 52.219-9 and AFARS Appendix DD.

3. If you have identified specific small businesses by name in the technical part of your proposal as businesses you intend to utilize on this contract, you must also list them in your subcontracting plan.

* An Indian tribe or tribally owned corporation does not have to qualify as a small business concern to be counted toward the Small Disadvantaged Business goal.

This template may be used by offerors in preparing their subcontracting plan. It is the responsibility of the offeror to ensure that its subcontracting plan meets the requirements of FAR 52.219-9 and is comparative to the commitments in its Small Business Participation Commitment Document.

SUBCONTRACTING PLAN

SOLICITATION NO.: W912PP23R0005

FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, BERNALILLO COUNTY, NEW MEXICO

Company Name:

DUNS #:
Cage Code
Tax ID#
Address:

PLAN TYPE: INDIVIDUAL SUBCONTRACTING PLAN

1. ACQUISITION:

Total dollar value of contract proposal including all options: $_____

2. GOALS (52.219-9(d)(1-2)):

Below indicate the dollar and percentage goals for Small Business (SB), Small Disadvantaged (SDB) including Alaska Native Corporations and Indian Tribes, Women-owned and Economically Disadvantaged Women-Owned (WOSB), Historically Underutilized Business Zone (HUBZone), Veteran Owned Small Business (VOSB), Service-Disabled Veteran-Owned (SDVOSB) Small Businesses and "Other than Small Business" (Other) as subcontractors.
In accordance with DFARS 219.705-4, the minimum subcontracting requirement for **SDB businesses is 5.0%.

(a)	Total estimated dollar value of **ALL planned subcontracting**, i.e., with ALL types of concerns under this contract and percent of planned subcontracting dollars (% of total value).	$_____	_____%
(b)	Total estimated dollar value and percent of planned subcontracting with **SMALL BUSINESSES** (including SDB, WOSB, HUBZone, VOSB and SDVOSB): (% of "a")	$_____	_____%
(c)	Total estimated dollar value and percent of planned subcontracting with **SMALL DISADVANTAGED BUSINESSES**: (% of "a")	$_____	_____%
(d)	Total estimated dollar value and percent of planned subcontracting with **WOMEN-OWNED SMALL BUSINESSES**: (% of "a")	$_____	_____%
(e)	Total estimated dollar and percent of planned subcontracting with **HUBZone SMALL BUSINESSES**: (% of "a")	$_____	_____%

(f)	Total estimated dollar and percent of planned subcontracting with **Veteran-Owned SMALL BUSINESSES**: (% of "a")	$_____	_____%
(g)	Total estimated dollar and percent of planned subcontracting with **Service-Disabled Veteran-Owned SMALL BUSINESSES**: (% of "a")	$_____	_____%
(h)	Total estimated dollar and percent of planned subcontracting with **"OTHER THAN SMALL BUSINESSES"** (As defined by the Small Business Administration as "any entity that is not classified as a small business. This includes large businesses, state and local governments, non-profit organizations, public utilities, educational institutions and foreign-owned firms.) (% of "a")	$_____	_____%

3. COMPANY'S POLICY (AFARS DD-301(1))

Provide your company's policy statement to Pub. L. 99-661, Section 1207, and Pub.L. 100-180, Section 806 (subcontracting to small business concerns). Describe special emphasis placed on subcontracting with SDBs. Describe corporate and management commitment to meeting your subcontracting plan.

4. DESCRIPTION OF SUPPLIES/SERVICES (FAR 52.219-9(d)(3)):

Provide a description of ALL the supplies and services to be subcontracted and identify the types of supplies or services planned for subcontracting to small business (including ANCs and Indian tribes), VOSB, SDVOSB, HUBZone, SDB and WOSB concerns.

5. DESCRIPTION OF THE METHOD USED TO DEVELOP SUBCONTRACTING GOALS FOR SB AND SB CONCERNS (FAR 52.219-9(d)(4)):

Provide a description of the method used to develop the subcontracting goals for SB, SDB, WOSB, HUBZone and SDVOSB concerns.

6. POTENTIAL SOURCES FOR SOLICITATION (FAR 52.219-9(d)(5)):

Provide a description of the method used to identify potential sources for the solicitation (e.g., existing company source lists, SAM, veterans service organizations, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small, HUBZone, small disadvantaged, and women-owned small business trade associations). Identify any source lists or other resources used in the determination process.

7. INDIRECT COST (FAR 52.219-9(d)(6)):

Indirect and overhead costs _____HAVE /_____HAVE NOT been included in the subcontracting goals.

If indirect costs HAVE been included, explain the method used to determine the proportionate share of such costs to be allocated as subcontracts to SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns:

_____

_____

8. PROGRAM ADMINISTRATOR (FAR 52.219-9(d)(7)):

This individual is employed by our company and will be the administrator of our Subcontracting Program:

Name: Title: Address:
Telephone Number:
E-Mail Address:

Duties : Does the individual named above have general overall responsibility for the company's subcontracting program, i.e., developing, preparing, and executing subcontracting plans and monitoring performance relative to the requirements of those subcontracting plans and perform the following duties? (If NO is checked, please indicate who in the company performs those duties, or indicate why the duties are not performed in your company)

YES	NO	Duties
____	____	Developing and promoting company-wide policy initiatives that demonstrate the company's support for awarding contracts and subcontracts to SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns; and for assuring that these concerns are included on the source lists for solicitations for products and services they are capable of providing;
____	____	Developing and maintaining bidder source lists of SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns from all possible sources;
____	____	Ensuring periodic rotation of potential subcontractors on bidder's lists;
____	____	Assuring that SB, SDB, WOSB, HUBZone, VOSB and SDVOSB businesses are included on the bidders' list for every subcontract solicitation for products and services that they are capable of providing.
____	____	Ensuring that Requests for Proposals (RFPs) are designed to permit the maximum practicable participation of SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns.
____	____	Reviewing subcontract solicitations to remove statements, clauses, etc., which might tend to restrict or prohibit small, 8(a), SDB, WOSB, HUBZone, VOSB and SDVOSB small business participation.
____	____	Accessing various sources for the identification of SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns to include the System for Award Management (http://sam.gov), local small business and minority associations, local chambers of commerce and Federal agencies' Small Business Offices;
____	____	Establishing and maintaining contract and subcontract award records;
____	____	Participating in Business Opportunity Workshops, Minority Business Enterprise Seminars, Trade Fairs, Procurement Conferences, etc;
____	____	Ensuring that SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns are made aware of subcontracting opportunities and assisting concerns in preparing responsive bids to the company;
____	____	Conducting or arranging for the conduct of training for purchasing personnel regarding the intent and impact of Section 8(d) of the Small Business Act, as amended;
____	____	Monitoring the company's subcontracting program performance and making any adjustments necessary to achieve the subcontract plan goals;
____	____	Preparing and submitting timely, required subcontract reports;
____	____	Conducting or arranging training for purchasing personnel regarding the intent and impact of 8(d) of the Small Business Act on purchasing procedures;
____	____	Coordinating the company's activities during the conduct of compliance reviews by Federal agencies;
		Other duties:

_____
_____
_____
_____

9. EQUITABLE OPPORTUNITY (FAR 52.219-9(d)(8)):
Describe efforts the Offeror will undertake to ensure that SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns will have an equitable opportunity to compete for subcontracts.

10. STATEMENT OF FLOW DOWN (FAR 52.219-9(d)(9)):

The Offeror provides assurance that:

YES	**Assertion:**
_____	(a) Clause 52.219-8 Utilization of Small Business Concerns will be included in all subcontracts that offer further subcontracting opportunities.
_____	(b) All subcontractors (except small businesses) that receive subcontracts in excess of $700,000 ($1.5 million for Construction) will be required to adopt a plan that complies with the requirements of the clause at 52.219-9 Small Business Subcontracting Plan.

11. REPORTING AND COOPERATION (FAR 52.219-9(d)(10)):

The Offeror provides assurance to:

YES	**Assertion:**
_____	(a) Cooperate in any studies or surveys as may be required
_____	(b) Submit periodic reports so that the Government can determine the extent of compliance by the Offeror with the subcontracting plan.
_____	(c) Submit the Individual Subcontract Report (ISR), and the Summary Subcontract Report (SSR) using the Electronic Subcontracting Reporting System (eSRS) (http://www.esrs.gov), following the instructions in the eSRS

(i) The ISR shall be submitted semi-annually during contract performance for the periods ending March 31 and September 30. A report is also required for each contract within 30 days of contract completion. Reports are due 30 days after the close of each reporting period, unless otherwise directed by the contracting officer. Reports are required when due, regardless of whether there has been any subcontracting activity since the inception of the contract or the previous reporting period. When a contracting officer rejects an ISR, the contractor is required to submit a revised ISR within 30 days of receiving the notice of the ISR rejection.

(ii) The SSR shall be submitted annually by October 30 for the twelve-month period ending September 30. When an SSR is rejected, the contractor is required to submit a revised SSR within 30 days of receiving the notice of SSR rejection;

_____	(d) Ensure that subcontractors with subcontracting plans agree to submit the ISR and/or the SSR using the eSRS

_____ (e) Provide prime contract number and DUNS number, and the e-mail address of the Offeror's official responsible for acknowledging receipt of or rejecting the ISRs to all first-tier subcontractors with subcontracting plans so they can enter this information into the eSRS when submitting their ISRs

_____ (f) Require that each subcontractor with a subcontracting plan provide the prime contract number, its own DUNS number, and the e-mail address of the subcontractor's official responsible for acknowledging receipt of or rejecting the ISRs, to subcontractors with subcontracting plans

12. RECORD KEEPING (FAR 52.219-9(d)(11)):

FAR 52.219-9(d)(11) requires a description list of the types of records your company will maintain to demonstrate the procedures adopted to comply with the requirements and goals in the subcontracting plan. The following is a recitation of the types of records the Offeror will maintain to demonstrate the procedures adopted to comply with the requirements and goals in the subcontracting plan. These records will include, but are not be limited to, the following:

(a) SB, SDB, WOSB, HUBZone, VOSB and SDVOSB source lists, guides and other data identifying such vendors;
(b) Organizations contacted in an attempt to locate SB, SDB, WOSB, HUBZone, VOSB and SDVOSB sources;
(c) On a contract-by-contract basis, records on all subcontract solicitations over Simplified Acquisition Threshold, which indicate for each solicitation (1) whether SB, SDB, WOSB, HUBZone, VOSB and/or SDVOSB concerns were solicited, if not, why not and the reasons solicited concerns did not receive subcontract awards;
(d) Records to support other outreach efforts, e.g., (A) Trade associations; (B) Business development organizations; (C) Conferences and trade fairs to locate small, HUBZone small, small disadvantaged, service-disabled veteran-owned, and women-owned small business sources; and (D) Veterans service organizations.
(e) Records to support internal guidance and encouragement provided to buyers through (1) workshops, seminars, training programs, incentive awards; and (2) monitoring performance to evaluate compliance with the program and requirements; and
(f) On a contract-by-contract basis, records to support subcontract award data including the name, address, and business type and size of each subcontractor. (This is not required on a contract–by–contract basis for commercial plans.)
(g) Other records to support your compliance with the subcontracting plan: (Please describe)
_____
_____
_____

13. GOOD FAITH EFFORT (FAR 52.219-9(d)(12))

Maximum practicable utilization of SB, SDB, WOSB, HUBZone, VOSB and SDVOSB concerns as subcontractors in Government contracts is a matter of national interest with both social and economic benefits. When a contractor fails to make a good faith effort to comply with a subcontracting plan, these objectives are not achieved, and 15 U.S.C. 637(d) (4) (F) directs that liquidated damages shall be paid by the contractor.

(a) Provide assurance that the Offeror will make a good faith effort to acquire articles, equipment, supplies, services, or materials, or obtain the performance of construction work from the small business concerns that it used in preparing the bid or proposal, in the same or greater scope,

amount, and quality used in preparing and submitting the bid or proposal. Responding to a request for a quote does not constitute use in preparing a bid or proposal. The Offeror used a small business concern in preparing the bid or proposal if—

(i) The Offeror identifies the small business concern as a subcontractor in the bid or proposal or associated small business subcontracting plan, to furnish certain supplies or perform a portion of the subcontract; or

(ii) The Offeror used the small business concern's pricing or cost information or technical expertise in preparing the bid or proposal, where there is written evidence of an intent or understanding that the small business concern will be awarded a subcontract for the related work if the Offeror is awarded the contract.

(b) In order to demonstrate your compliance with a good faith effort to achieve the SB, SDB, WOSB, HUBZone, VOSB and SDVOSB small business subcontracting goals, outline the steps your company plans to take.

_____
_____
_____

14. PERFORMANCE (FAR 52.219-9(d)(13))

Provide assurances that the Offeror will provide to the Contracting Officer, within 30 days of contract completion, a written explanation if the contractor fails to acquire articles, equipment, supplies, services or materials or obtain the performance of construction work as described in the bid or proposal.

15. SUBCONTRACTORS (FAR 52.219-9(d)(14 -15))

The Offeror provides assurance to:

YES	**Assertion:**
_____	(a) Not prohibit a subcontractor from discussing with the Contracting Officer any material matter pertaining to payment to or utilization of a subcontractor.
_____	(b) Pay its small business subcontractors on time and in accordance with the terms and conditions of the underlying subcontract, and notify the contracting officer when the prime contractor makes either a reduced or an untimely payment to a small business subcontractor (see 52.242-5).

PREPARER OF THE SUBCONTRACTING PLAN

Signature:_____ Date: _____

Name: _____
Title: _____
Telephone No.: _____
Email Address: _____

CONTRACT DESCRIPTION FORM

Volume 1, Tab A, Section 1 **Control No.: W912PP23R0005**

Provide a completed form for each project for which experience is being submitted. Project experience submitted by the offeror as a subcontractor will not be evaluated.

(a) OFFEROR'S NAME (Prime Contractor): _____

Project Name: _____

Project Location: _____

Client/Customer: _____

(b) Contract Number: _____
(For Indefinite Delivery type contracts, GSA contracts, and Blanket Purchase Agreements, include Delivery Order Numbers)

Contract Type (e.g. Fixed-Priced, Cost Reimbursement, etc.): _____

Awarded price/cost: _____

Final or projected final price/cost: _____

Original delivery schedule (include dates of start and completion): _____
_____

Final or projected delivery schedule (include dates of start and completion):_____

Percent of Completion (if project is currently under construction) _____
_____

(c) Client/Customer Point of Contact: _____

Address: _____
Email: _____
Fax: _____
Telephone: _____

(d) Government Contracting Activity/Agency (if applicable): _____

Address: _____
Contracting Officer: _____
Email: _____
Fax: _____
Telephone: _____

Government Contract Administration Activity (if applicable:_____

Administrative Contracting Officer (ACO): _____
Contracting Officer Representative (COR): _____
Address: _____
Email: _____

Fax: _____
Telephone: _____

(e) Description of project: (Provide a specific narrative explanation of the contract and objectives achieved. Detail how the effort is relevant to the requirement of this RFP):

(f) If contract did not meet original schedule or technical performance requirements, provide a brief explanation of the reason(s) for the shortcomings and any corrective action(s) taken to avoid recurrence:

(g) List each time the delivery schedule was revised and provide an explanation of why the revision was necessary. Address all Requests for Deviation and Requests for Waiver with respect to causes and corrective actions:

(h) Was the project terminated early or was Cure Notices or Show Cause Letters received on this contract? Yes ____ No____: If yes, explain nature of termination (default/convenience). Provide copy of any Cure Notices or Show Cause Letters received and describe any corrective action(s) implemented by the offeror or subcontractor:

_____
_____
_____
_____
_____

(i) Safety record (Use the number reported on OSHA Form No. 200 or equivalent):
Injuries with Lost Workdays _____
Injuries without Lost Workdays _____

Explain any injuries that occurred and corrective action(s) taken:_____
_____
_____
_____
_____

(j) List and explain any customer concerns or dissatisfaction. Explain how you responded:
_____
_____
_____
_____
_____

(k) Small Business Subcontracting Effort (Complete for Offeror/Prime Contractor only):

Large Business Offerors Only:

What were the various small business percentage goals in the original contract and the actual percentage attained, if applicable (see FAR 52.219-9)?

	Goal (%)	**Actual (%)**
Small Business (SB):	_____	_____
8(a) Small Business:	_____	_____
Woman Owned Small Business (WOSB):	_____	_____
Historically Underutilized Business Zone (HUBZone):	_____	_____
Veteran Owned Small Business (VOSB):	_____	_____
Service Disabled Veteran Owned Small Business (SDVOSB):	_____	_____

If goals were not met, explain:_____
_____
_____
_____
_____

Large and Small Business Offerors: List types of work subcontracted to small businesses and percentage of contract (see FAR 52.219-8, Utilization of Small Business Concerns):

Type of Work Subcontracted to SB	**% of Contract**
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

6. _____ _____

(l) If applicable, provide data on all manufacturing warranty returns. Data shall delineate total number of warranty returns. Data shall delineate total number of warranty returns, number of Could Not Duplicate (CND), number of failures attributable to GFE component Failures, and number and nature of failures attributable to the offeror's delivered product:_____
_____
_____
_____
_____

USACE PAST PERFORMANCE QUESTIONNAIRE (Form PPQ-0)
CONTROL # :W912PP23R0005

Note: The past performance questionnaire consists of a total of five (5) pages.

CONTRACT INFORMATION (Offeror to complete Blocks 1-4)

1. Contractor Information
Firm Name:

CCR CAGE Code:

Address:

CCR DUNs Number:

Phone Number:

Email Address:

Point of Contact: Contact Phone Number:

2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other
Explain:

Percent of project work performed:

If subcontractor, who was the prime (Name/Phone #):

3. Contract Information
Contract Number:

Delivery/Task Order Number (if applicable):

Contract Type: ☐ Firm Fixed Price ☐ Cost Reimbursement ☐ Other (Please specify):

Contract Title:

Contract Location:

Award Date (mm/dd/yy):

Contract Completion Date (mm/dd/yy):

Actual Completion Date (mm/dd/yy):

Explain Differences:

Original Contract Price (Award Amount):

Final Contract Price (*to include all modifications, if applicable*):

Explain Differences:

4. Project Description:
Complexity of Work ☐ High ☐ Med ☐ Routine
How is this project relevant to project of submission? (*Please provide details such as similar equipment, requirements, conditions, etc.*)

CLIENT INFORMATION (Client to complete Blocks 5-8)

5. Client Information

Name:

Title:

Phone Number:

Email Address:

6. Describe the client's role in the project:

7. Date Questionnaire was completed (mm/dd/yy)**:**

8. Client's Signature:

NOTE: NAVFAC/USACE REQUESTS THAT THE CLIENT COMPLETES THIS QUESTIONNAIRE AND SUBMITS DIRECTLY BACK TO THE OFFEROR. THE OFFEROR WILL SUBMIT THE COMPLETED QUESTIONNAIRE TO USACE WITH THEIR PROPOSAL, AND MAY DUPLICATE THIS QUESTIONNAIRE FOR FUTURE SUBMISSION ON USACE SOLICITATIONS. CLIENTS ARE HIGHLY ENCOURAGED TO SUBMIT QUESTIONNAIRES DIRECTLY TO THE OFFEROR. HOWEVER, QUESTIONNAIRES MAY BE SUBMITTED DIRECTLY TO USACE. PLEASE CONTACT THE OFFEROR FOR USACE POC INFORMATION. THE GOVERNMENT RESERVES THE RIGHT TO VERIFY ANY AND ALL INFORMATION ON THIS FORM.

CONTROL #: W912PP23R0005

ADJECTIVE RATINGS AND DEFINITIONS TO BE USED TO BEST REFLECT YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE

RATING	DEFINITION	NOTE
(E) Exceptional	Performance meets contractual requirements and exceeds many to the Government/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with few minor problems for which corrective actions taken by the contractor was highly effective.	An Exceptional rating is appropriate when the Contractor successfully performed multiple significant events that were of benefit to the Government/Owner. A singular benefit, however, could be of such magnitude that it alone constitutes an Exceptional rating. Also, there should have been NO significant weaknesses identified.
(VG) Very Good	Performance meets contractual requirements and exceeds some to the Government's/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with some minor problems for which corrective actions taken by the contractor were effective.	A Very Good rating is appropriate when the Contractor successfully performed a significant event that was a benefit to the Government/Owner. There should have been no significant weaknesses identified.
(S) Satisfactory	Performance meets minimum contractual requirements. The contractual performance of the element or sub-element contains some minor problems for which corrective actions taken by the contractor appear or were satisfactory.	A Satisfactory rating is appropriate when there were only minor problems, or major problems that the contractor recovered from without impact to the contract. There should have been NO significant weaknesses identified. Per DOD policy, a fundamental principle of assigning ratings is that contractors will not be assessed a rating lower than Satisfactory solely for not performing beyond the requirements of the contract.
(M) Marginal	Performance does not meet some contractual requirements. The contractual performance of the element or sub-element being assessed reflects a serious problem for which the contractor has not yet identified corrective actions. The contractor's proposed actions appear only marginally effective or were not fully implemented.	A Marginal is appropriate when a significant event occurred that the contractor had trouble overcoming which impacted the Government/Owner.
(U) Unsatisfactory	Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance of the element or sub-element contains serious problem(s) for which the contractor's corrective actions appear or were ineffective.	An Unsatisfactory rating is appropriate when multiple significant events occurred that the contractor had trouble overcoming and which impacted the Government/Owner. A singular problem, however, could be of such serious magnitude that it alone constitutes an unsatisfactory rating.
(N) Not Applicable	No information or did not apply to your contract	Rating will be neither positive nor negative.

TO BE COMPLETED BY CLIENT

PLEASE CIRCLE THE ADJECTIVE RATING WHICH BEST REFLECTS YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE.

1. QUALITY:						
a) Quality of technical data/report preparation efforts	E	VG	S	M	U	N
b) Ability to meet quality standards specified for technical performance	E	VG	S	M	U	N
c) Timeliness/effectiveness of contract problem resolution without extensive customer guidance	E	VG	S	M	U	N
d) Adequacy/effectiveness of quality control program and adherence to contract quality assurance requirements (without adverse effect on performance)	E	VG	S	M	U	N
2. SCHEDULE/TIMELINESS OF PERFORMANCE:						
a) Compliance with contract delivery/completion schedules including any significant intermediate milestones. *(If liquidated damages were assessed or the schedule was not met, please address below)*	E	VG	S	M	U	N
b) Rate the contractor's use of available resources to accomplish tasks identified in the contract	E	VG	S	M	U	N
3. CUSTOMER SATISFACTION:						
a) To what extent were the end users satisfied with the project?	E	VG	S	M	U	N
b) Contractor was reasonable and cooperative in dealing with your staff (including the ability to successfully resolve disagreements/disputes; responsiveness to administrative reports, businesslike and communication)	E	VG	S	M	U	N
c) To what extent was the contractor cooperative, businesslike, and concerned with the interests of the customer?	E	VG	S	M	U	N
d) Overall customer satisfaction	E	VG	S	M	U	N
4. MANAGEMENT/ PERSONNEL/LABOR						
a) Effectiveness of on-site management, including management of subcontractors, suppliers, materials, and/or labor force?	E	VG	S	M	U	N
b) Ability to hire, apply, and retain a qualified workforce to this effort	E	VG	S	M	U	N
c) Government Property Control	E	VG	S	M	U	N
d) Knowledge/expertise demonstrated by contractor personnel	E	VG	S	M	U	N
e) Utilization of Small Business concerns	E	VG	S	M	U	N
f) Ability to simultaneously manage multiple projects with multiple disciplines	E	VG	S	M	U	N
g) Ability to assimilate and incorporate changes in requirements and/or priority, including planning, execution and response to Government changes	E	VG	S	M	U	N
h) Effectiveness of overall management (including ability to effectively lead, manage and control the program)	E	VG	S	M	U	N
5. COST/FINANCIAL MANAGEMENT						
a) Ability to meet the terms and conditions within the contractually agreed price(s)?	E	VG	S	M	U	N
b) Contractor proposed innovative alternative methods/processes that reduced cost, improved maintainability or other factors that benefited the client	E	VG	S	M	U	N
c) If this is/was a Government cost type contract, please rate the Contractor's timeliness and accuracy in submitting monthly invoices with appropriate back-up documentation, monthly status reports/budget variance reports, compliance	E	VG	S	M	U	N

with established budgets and avoidance of significant and/or unexplained variances (under runs or overruns)						
d) Is the Contractor's accounting system adequate for management and tracking of costs? *If no, please explain in Remarks section.*	Yes			No		
e) If this is/was a Government contract, has/was this contract been partially or completely terminated for default or convenience or are there any pending terminations? *Indicate if show cause or cure notices were issued, or any default action in comment section below.*	Yes			No		
f) Have there been any indications that the contractor has had any financial problems? *If yes, please explain below.*	Yes			No		
6. SAFETY/SECURITY						
a) To what extent was the contractor able to maintain an environment of safety, adhere to its approved safety plan, and respond to safety issues? (Includes: following the users rules, regulations, and requirements regarding housekeeping, safety, correction of noted deficiencies, etc.)	E	VG	S	M	U	N
b) Contractor complied with all security requirements for the project and personnel security requirements.	E	VG	S	M	U	N
7. GENERAL						
a) Ability to successfully respond to emergency and/or surge situations (including notifying COR, PM or Contracting Officer in a timely manner regarding urgent contractual issues).	E	VG	S	M	U	N
b) Compliance with contractual terms/provisions *(explain if specific issues)*	E	VG	S	M	U	N
c) Would you hire or work with this firm again? *(If no, please explain below)*	Yes			No		
d) In summary, provide an overall rating for the work performed by this contractor.	E	VG	S	M	U	N

Please provide responses to the questions above (*if applicable*) and/or additional remarks. Furthermore, please provide a brief narrative addressing specific strengths, weaknesses, deficiencies, or other comments which may assist our office in evaluating performance risk *(please attach additional pages if necessary)***:**

_____

_____

_____

_____

FINANCIAL STANDING QUESTIONNAIRE

Solicitation W912PP23R0005, FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, BERNALILLO COUNTY, NEW MEXICO

A primary consideration in our selection process is an affirmation determination of the contractor's responsibility, qualification, and financial standing. Prior to awarding a contract, per the Federal Acquisition Regulation (FAR) Part 9, the U.S. Army Corps of Engineers must determine through acceptable evidence that the contractor has adequate financial resources to perform the contract, or the ability to obtain the financial resources, or proposes to perform the contract by subcontracting.

Please make every effort to be thorough in your answers/comments and include the completed questionnaire in your proposal.

Please contact David Terhune, Contract Specialist, David.e.terhune@usace.army.mil with any questions or concerns.

A. GENERAL INFORMATION

Contractor Name:
Point of Contact:
Telephone:
Email:

B. RESPONDENT INFORMATION (Person completing this form)

Name and Title: _____
Organization and Address: _____
Telephone/Fax: _____
Email: _____

1. Does the contractor have an active account with your financial institution?
2. How long has this account been active?
3. What is their average balance (digits only)?
4. How many returns (insufficient funds) has the contractor had in the last 12 months?
5. How many loans does the contractor currently have outstanding?
6. Has the vendor been able to meet their financial obligations on time?
7. Do they have a line of credit? If so, what is that amount (digits only)?

NOTE: The financial questionnaire is to be "**COMPLETED BY YOUR FINANCIAL INSTITUTION**." Please return the completed document with an affixed bank seal and signature of the referenced individual on the questionnaire. Failure to provide the requested information will result in exclusion from further consideration.

Section 00 45 00 - Representations and Certifications

REPS AND CERTS
THIS DOCUMENT IS TO BE EXECUTED AND SUBMITTED WITH YOUR OFFER.

REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFEROR

RFP NO. **W912PP23R0005**

PROJECT NAME/LOCATION: FY23 VA NRM Repair/Replace Elevators in B-41, Raymond G. Murphy VA Medical Center, Bernalillo County, NM.

OFFEROR'S NAME AND ADDRESS

_____

_____

_____

_____

Date: _____

The Offeror makes the following representations and certifications as a part of the RFP identified above (check the appropriate boxes that follow):

CLAUSES INCORPORATED BY REFERENCE

52.209-7	Information Regarding Responsibility Matters	OCT 2018
52.236-28	Preparation of Proposals--Construction	OCT 1997
252.203-7005	Representation Relating to Compensation of Former DoD Officials	SEP 2022
252.204-7008	Compliance With Safeguarding Covered Defense Information Controls	OCT 2016

CLAUSES INCORPORATED BY FULL TEXT

52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (MAY 2022)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 238290.

(2) The small business size standard is 22,000,000.

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce is 500 employees if the acquisition--

(i) Is set aside for small business and has a value above the simplified acquisition threshold;

(ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or

(iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(b)(1) If the provision at 52.204-7, System for Award Management, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the provision at 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may
choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by
checking one of the following boxes:

( ) Paragraph (d) applies.

( ) Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c) (1) The following representations or certifications in SAM are applicable to this solicitation as indicated:

(i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless—

(A) The acquisition is to be made under the simplified acquisition procedures in Part 13;

(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or

(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.

(iii) 52.203-18, Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements--Representation. This provision applies to all solicitations.

(iv) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the provision at 52.204-7, System for Award Management.

(v) 52.204-5, Women-Owned Business (Other Than Small Business). This provision applies to solicitations that—

(A) Are not set aside for small business concerns;

(B) Exceed the simplified acquisition threshold; and

(C) Are for contracts that will be performed in the United States or its outlying areas.

(vi) 52.204-26, Covered Telecommunications Equipment or Services--Representation. This provision applies to all solicitations.

(vii) 52.209-2, Prohibition on Contracting with Inverted Domestic Corporations--Representation.

(viii) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.

(ix) 52.209-11, Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. This provision applies to all solicitations.

(x) 52.214-14, Place of Performance--Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.

(xi) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.

(xii) 52.219-1, Small Business Program Representations (Basic, Alternates I, and II). This provision applies to solicitations when the contract is for supplies to be delivered or services to be performed in the United States or its outlying areas, or when the contracting officer has applied part 19 in accordance with 19.000(b)(1)(ii).

(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.

(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.

(C) The provision with its Alternate II applies to solicitations that will result in a multiple-award contract with more than one NAICS code assigned.

(xiii) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract is for supplies to be delivered or services to be performed in the United States or its outlying areas, or when the contracting officer has applied part 19 in accordance with 19.000(b)(1)(ii).

(xiv) 52.222-22, Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xv) 52.222-25, Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xvi) 52.222-38, Compliance with Veterans' Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial products or commercial services.

(xvii) 52.223-1, Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA-designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xviii) 52.223-4, Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA- designated items.

(xix) 52.223-22, Public Disclosure of Greenhouse Gas Emissions and Reduction Goals--Representation. This provision applies to solicitations that include the clause at 52.204-7.)

(xx) 52.225-2, Buy American Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xxi) 52.225-4, Buy American--Free Trade Agreements--Israeli Trade Act Certificate. (Basic, Alternates I, II, and III.) This provision applies to solicitations containing the clause at 52.225- 3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $92,319, the provision with its Alternate II applies.

(D) If the acquisition value is $92,319 or more but is less than $100,000, the provision with its Alternate III applies.

(xxii) 52.225-6, Trade Agreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xxiii) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan--Certification. This provision applies to all solicitations.

(xxiv) 52.225-25, Prohibition on Contracting with Entities Engaging in Certain Activities or Transactions Relating to Iran—Representation and Certification. This provision applies to all solicitations.

(xxv) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions.

(2) The following representations or certifications are applicable as indicated by the Contracting Officer:

[Contracting Officer check as appropriate.]

X (i) 52.204-17, Ownership or Control of Offeror.

X (ii) 52.204-20, Predecessor of Offeror.

(iii) 52.222-18, Certification Regarding Knowledge of Child Labor for Listed End Products.

(iv) 52.222-48, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment--Certification.

(v) 52.222-52 Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services--Certification.

(vi) 52.223-9, with its Alternate I, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (Alternate I only).

(vii) 52.227-6, Royalty Information.

(A) Basic.

(B) Alternate I.

(viii) 52.227-15, Representation of Limited Rights Data and Restricted Computer Software.

(d) The Offeror has completed the annual representations and certifications electronically in SAM accessed through https://www.sam.gov. After reviewing the SAM information, the Offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to insert changes, identifying change by clause number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on SAM.

(End of provision)

52.204-24 REPRESENTATION REGARDING CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (NOV 2021)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in paragraph (c)(1) in the provision at 52.204-26, Covered Telecommunications Equipment or Services--Representation, or in paragraph (v)(2)(i) of the provision at 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services. The Offeror shall not complete the representation in paragraph (d)(2) of this provision if the Offeror has represented that it "does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services" in paragraph (c)(2) of the provision at 52.204-26, or in paragraph (v)(2)(ii) of the provision at 52.212-3.

(a) Definitions. As used in this provision-

Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) Prohibition.

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to--

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to--

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services."

(d) Representations. The Offeror represents that--

(1) It [___] will, [___] will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that--

It [___] does, [___] does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) Disclosures.

(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment--

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services--

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment--

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services--

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(End of provision)

52.209-13 VIOLATION OF ARMS CONTROL TREATIES OR AGREEMENTS--CERTIFICATION (NOV 2021)

(a) This provision does not apply to acquisitions at or below the simplified acquisition threshold or to acquisitions of commercial products and commercial services as defined in Federal Acquisition Regulation 2.101.

(b) Certification. [Offeror shall check either (1) or (2).]

____ (1) The Offeror certifies that--

(i) It does not engage and has not engaged in any activity that contributed to or was a significant factor in the President's or Secretary of State's determination that a foreign country is in violation of its obligations undertaken in any arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. The determinations are described in the most recent unclassified annual report provided to Congress pursuant to section 403 of the Arms Control and Disarmament Act (22 U.S.C. 2593a). The report is available at https://www.state.gov/bureaus-offices/under-secretary-for-arms-control-and-international-security-affairs/bureau-of-arms-control-verification-and-compliance/; and

(ii) No entity owned or controlled by the Offeror has engaged in any activity that contributed to or was a significant factor in the President's or Secretary of State's determination that a foreign country is in violation of its obligations undertaken in any arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. The determinations are described in the most recent unclassified annual report provided to Congress pursuant to section 403 of the Arms Control and Disarmament Act (22 U.S.C. 2593a). The report is available at https://www.state.gov/bureaus-offices/under-secretary-for-arms-control-and-international-security-affairs/bureau-of-arms-control-verification-and-compliance/; or

____ (2) The Offeror is providing separate information with its offer in accordance with paragraph (d)(2) of this provision.

(c) Procedures for reviewing the annual unclassified report (see paragraph (b)(1) of this provision). For clarity, references to the report in this section refer to the entirety of the annual unclassified report, including any separate reports that are incorporated by reference into the annual unclassified report.

(1) Check the table of contents of the annual unclassified report and the country section headings of the reports incorporated by reference to identify the foreign countries listed there. Determine whether the Offeror or any person owned or controlled by the Offeror may have engaged in any activity related to one or more of such foreign countries.

(2) If there may have been such activity, review all findings in the report associated with those foreign countries to determine whether or not each such foreign country was determined to be in violation of its obligations undertaken in an arms control, nonproliferation, or disarmament agreement to which the United States is a party, or to be not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. For clarity, in the annual report an explicit certification of non-compliance is equivalent to a determination of violation. However, the following statements in the annual report are not equivalent to a determination of violation:

(i) An inability to certify compliance.

(ii) An inability to conclude compliance.

(iii) A statement about compliance concerns.

(3) If so, determine whether the Offeror or any person owned or controlled by the Offeror has engaged in any activity that contributed to or is a significant factor in the determination in the report that one or more of these foreign countries is in violation of its obligations undertaken in an arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. Review the narrative for any such findings reflecting a determination of violation or non-adherence related to those foreign countries in the report, including the finding itself, and to the extent necessary, the conduct giving rise to the compliance or adherence concerns, the analysis of compliance or adherence concerns, and efforts to resolve compliance or adherence concerns.

(4) The Offeror may submit any questions with regard to this report by email to NDAA1290Cert@state.gov. To the extent feasible, the Department of State will respond to such email inquiries within 3 business days.

(d) Do not submit an offer unless--

(1) A certification is provided in paragraph (b)(1) of this provision and submitted with the offer; or

(2) In accordance with paragraph (b)(2) of this provision, the Offeror provides with its offer information that the President of the United States has--

(i) Waived application under U.S.C. 2593e(d) or (e); or

(ii) Determined under 22 U.S.C. 2593e(g)(2) that the entity has ceased all activities for which measures were imposed under 22 U.S.C.2593e(b).

(e) Remedies. The certification in paragraph (b)(1) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly submitted a false certification, in addition to other remedies available to the Government, such as suspension or debarment, the Contracting Officer may terminate any contract resulting from the false certification.

(End of provision)

252.204-7007 ALTERNATE A, ANNUAL REPRESENTATIONS AND CERTIFICATIONS (MAY 2021)

Substitute the following paragraphs (b), (d) and (e) for paragraphs (b) and (d) of the provision at FAR 52.204-8:

(b)(1) If the provision at FAR 52.204-7, System for Award Management, is included in this solicitation, paragraph (e) of this provision applies.

(2) If the provision at FAR 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may choose to use paragraph (e) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by checking one of the following boxes:

__ (i) Paragraph (e) applies.

__ (ii) Paragraph (e) does not apply and the Offeror has completed the individual representations and certifications in the solicitation.

(d)(1) The following representations or certifications in the SAM database are applicable to this solicitation as indicated:

(i) 252.204-7016, Covered Defense Telecommunications Equipment or Services--Representation. Applies to all solicitations.

(ii) 252.216-7008, Economic Price Adjustment--Wage Rates or Material Prices Controlled by a Foreign Government. Applies to solicitations for fixed-price supply and service contracts when the contract is to be performed wholly or in part in a foreign country, and a foreign government controls wage rates or material prices and may during contract performance impose a mandatory change in wages or prices of materials.

(iii) 252.225-7042, Authorization to Perform. Applies to all solicitations when performance will be wholly or in part in a foreign country.

(iv) 252.225-7049, Prohibition on Acquisition of Certain Foreign Commercial Satellite Services--Representations. Applies to solicitations for the acquisition of commercial satellite services.

(v) 252.225-7050, Disclosure of Ownership or Control by the Government of a Country that is a State Sponsor of Terrorism. Applies to all solicitations expected to result in contracts of $150,000 or more.

(vi) 252.229-7012, Tax Exemptions (Italy)--Representation. Applies to solicitations when contract performance will be in Italy.

(vii) 252.229-7013, Tax Exemptions (Spain)--Representation. Applies to solicitations when contract performance will be in Spain.

(viii) 252.247-7022, Representation of Extent of Transportation by Sea. Applies to all solicitations except those for direct purchase of ocean transportation services or those with an anticipated value at or below the simplified acquisition threshold.

(2) The following representations or certifications in SAM are applicable to this solicitation as indicated by the Contracting Officer:

____ (i) 252.209-7002, Disclosure of Ownership or Control by a Foreign Government.

____ (ii) 252.225-7000, Buy American--Balance of Payments Program Certificate.

____ (iii) 252.225-7020, Trade Agreements Certificate.

____ Use with Alternate I.

X (iv) 252.225-7031, Secondary Arab Boycott of Israel.

____ (v) 252.225-7035, Buy American--Free Trade Agreements--Balance of Payments Program Certificate.

____ Use with Alternate I.

____ Use with Alternate II.

____ Use with Alternate III.

____ Use with Alternate IV.

____ Use with Alternate V.

____ (vi) 252.226-7002, Representation for Demonstration Project for Contractors Employing Persons with Disabilities.

____ (vii) 252.232-7015, Performance-Based Payments--Representation.

(e) The Offeror has completed the annual representations and certifications electronically via the SAM website at https://www.acquisition.gov/. After reviewing the SAM database information, the Offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in FAR 52.204-8(c) and paragraph (d) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer, and are incorporated in

this offer by reference (see FAR 4.1201); except for the changes identified below [Offeror to insert changes, identifying change by provision number, title, date_____]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR/DFARS provision No.	Title	Date	Change

Any changes provided by the Offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications located in the SAM database.

(End of provision)

252.204-7016 COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES -- REPRESENTATION (DEC 2019)

(a) Definitions. As used in this provision, covered defense telecommunications equipment or services has the meaning provided in the clause 252.204-7018, Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services.

(b) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for “covered defense telecommunications equipment or services”.

(c) Representation. The Offeror represents that it [ ] does, [ ] does not provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(End of provision)

252.204-7017 PROHIBITION ON THE ACQUISITION OF COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES--REPRESENTATION (MAY 2021)

The Offeror is not required to complete the representation in this provision if the Offeror has represented in the provision at 252.204-7016, Covered Defense Telecommunications Equipment or Services--Representation, that it “does not provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.”

(a) Definitions. Covered defense telecommunications equipment or services, covered mission, critical technology, and substantial or essential component, as used in this provision, have the meanings given in the 252.204-7018 clause, Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services, of this solicitation.

(b) Prohibition. Section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91) prohibits agencies from procuring or obtaining, or extending or renewing a contract to procure or obtain, any

equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities that are excluded when providing any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless a waiver is granted.

(d) Representation. If in its annual representations and certifications in SAM the Offeror has represented in paragraph (c) of the provision at 252.204-7016, Covered Defense Telecommunications Equipment or Services--Representation, that it "does" provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument, then the Offeror shall complete the following additional representation:

The Offeror represents that it [ ] will [ ] will not provide covered defense telecommunications equipment or services as a part of its offered products or services to DoD in the performance of any award resulting from this solicitation.

(e) Disclosures. If the Offeror has represented in paragraph (d) of this provision that it "will provide covered defense telecommunications equipment or services," the Offeror shall provide the following information as part of the offer:

(1) A description of all covered defense telecommunications equipment and services offered (include brand or manufacturer; product, such as model number, original equipment manufacturer (OEM) number, manufacturer part number, or wholesaler number; and item description, as applicable).

(2) An explanation of the proposed use of covered defense telecommunications equipment and services and any factors relevant to determining if such use would be permissible under the prohibition referenced in paragraph (b) of this provision.

(3) For services, the entity providing the covered defense telecommunications services (include entity name, unique entity identifier, and Commercial and Government Entity (CAGE) code, if known).

(4) For equipment, the entity that produced or provided the covered defense telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known).

(End of provision)

252.225-7055 REPRESENTATION REGARDING BUSINESS OPERATIONS WITH THE MADURO REGIME (MAY 2022)

(a) Definitions. As used in this provision--

Agency or instrumentality of the government of Venezuela, business operations, government of Venezuela, and person have the meaning given in the clause 252.225-7056, Prohibition Regarding Business Operations with the Maduro Regime, of this solicitation.

(b) Prohibition. In accordance with section 890 of the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116-92), DoD is prohibited from entering into a contract for the procurement of products or services with any person that has business operations with an authority of the government of Venezuela that is not recognized as the legitimate government of Venezuela by the U.S. Government, unless the person has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.

(c) Representation. By submission of its offer, the Offeror represents that the Offeror is a person that--

(1) Does not have any business operations with an authority of the Maduro regime or the government of Venezuela that is not recognized as the legitimate government of Venezuela by the U.S. Government; or

(2) Has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.

(End of provision)

252.225-7973 PROHIBITION ON THE PROCUREMENT OF FOREIGN-MADE UNMANNED AIRCRAFT SYSTEMS - REPRESENTATION (MAY 2020) (DEVIATION 2020-O0015)

(a) *Prohibition*. Section 848 of the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116-92) prohibits DoD from using or procuring -

(1) An unmanned aircraft system (UAS), or any related services or equipment, that -

(i) Is manufactured in the People's Republic of China or by an entity domiciled in the People's Republic of China;

(ii) Uses flight controllers, radios, data transmission devices, cameras, or gimbals manufactured in the People's Republic of China or by an entity domiciled in the People's Republic of China;

(iii) Uses a ground control system or operating software developed in the People's Republic of China or by an entity domiciled in the People's Republic of China; or

(iv) Uses network connectivity or data storage located in, or administered by an entity domiciled in, the People's Republic of China; or

(2) A system for the detection or identification of a UAS, or any related services or equipment, that is manufactured-

(i) In the People's Republic of China; or

(ii) By an entity domiciled in the People's Republic of China.

(b) *Representations*. By submission of its offer, the Offeror represents that it will not provide or use -

(1) A UAS, as described in paragraph (a)(1) of this provision, in the performance of any contract, subcontract, or other contractual instrument resulting from this solicitation; and

(2) A system for the detection or identification of a UAS, as described in paragraph (a)(2) of this provision, in the performance of any contract, subcontract, or other contractual instrument resulting from this solicitation.

(End of provision)

252.225-7974 REPRESENTATION REGARDING BUSINESS OPERATIONS WITH THE MADURO REGIME (DEVIATION 2020-O0005) (FEB 2020)

(a) Definitions. As used in this provision -
Agency or instrumentality of the government of Venezuela means an agency or instrumentality of a foreign state as defined in section 28 U.S.C. 1603(b), with each reference in such section to "a foreign state" deemed to be a reference to "Venezuela".
Business operations means engaging in commerce in any form, including acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.
Government of Venezuela means the government of any political subdivision of Venezuela, and any agency or instrumentality of the government of Venezuela.
Person means -
(1) A natural person, corporation, company, business association, partnership, society, trust, or any other nongovernmental entity, organization, or group;
(2) Any governmental entity or instrumentality of a government, including a multilateral development institution (as defined in section 1701(c)(3) of the International Financial Institutions Act (22 U.S.C. 262r(c)(3)); and
(3) Any successor, subunit, parent entity, or subsidiary of, or any entity under common ownership or control with, any entity described in paragraphs (1) or (2) of this definition.
(b) Prohibition. In accordance with section 890 of the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116-92), contracting officers are prohibited from entering into a contract for the procurement of products or services with any person that has business operations with an authority of the government of Venezuela that is not recognized as the legitimate government of Venezuela by the United States Government, unless the person has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.
(c) Representation. By submission of its offer, the Offeror represents that the Offeror -
(1) Does not have any business operations with an authority of the Maduro regime or the government of Venezuela that is not recognized as the legitimate government of Venezuela by the United States Government; or
(2) Has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.
(End of provision)

252.232-7015 PERFORMANCE-BASED PAYMENTS--REPRESENTATION (DEC 2022)

(a) In accordance with 10 U.S.C. 3802(c), the Contractor's financial statements shall be in compliance with Generally Accepted Accounting Principles in order to receive performance-based payments.

(b) The Offeror represents that its financial statements are [ ] are not [ ] in compliance with Generally Accepted Accounting Principles.

(End of provision)

252.232-7016 NOTICE OF PROGRESS PAYMENTS OR PERFORMANCE-BASED PAYMENTS (APR 2020)

(a) The need for customary progress payments in accordance with subpart 32.5 of the Federal Acquisition Regulation (FAR) or performance-based payments in accordance with FAR subpart 32.10 will not be considered as a handicap or adverse factor in the award of the contract.

(b) This solicitation includes a FAR and Defense Federal Acquisition Regulation Supplement (DFARS) clause for performance-based payments and a FAR clause for progress payments. The resultant contract will include either performance-based payments or progress payments, not both, except as may be authorized on separate orders

subject to FAR 32.1003(c).

(1) The performance-based payments clauses will be included in the contract if--

(i) The Offeror has provided positive representation in response to DFARS 252.232-7015, Performance-Based Payments--Representation;

(ii) The Offeror proposes a performance-based payment arrangement in accordance with FAR 52.232-28, Invitation to Propose Performance-Based Payments, including proposed events and timing, event completion criteria, event values, and expected expenditure profile; and

(iii) The Offeror and the Government reach agreement on all aspects of the arrangement.

(2) If performance-based payments clauses are not included in the resultant contract, the progress payments clause included in this solicitation will be included in any resultant contract, modified or altered if necessary in accordance with FAR 52.232-16 and its Alternate I. Even though the progress payments clause is included in the contract, the clause shall be inoperative during any time the contractor's accounting system and controls are determined by the Government to be inadequate for segregation and accumulation of contract costs.

(End of provision)

Section 00 50 00 - Contracting Forms and Supplements

WAGE DETERMINATION BLDG

"General Decision Number: NM20230044 03/31/2023

Superseded General Decision Number: NM20220044

State: New Mexico

Construction Type: Building
BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

County: Bernalillo County in New Mexico.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2023

1	01/13/2023
2	03/03/2023
3	03/17/2023
4	03/31/2023

ASBE0076-008 01/01/2023

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 35.76	11.73

CARP1505-001 06/01/2018

	Rates	Fringes
CARPENTER (Includes Drywall Finishing/Taping, Drywall Hanging, and Metal Stud Installation (Excludes Form Work))	$ 24.08	10.79

ELEC0611-022 01/01/2023

	Rates	Fringes
ELECTRICIAN	$ 36.75	12.77

ELEV0131-002 01/01/2023

	Rates	Fringes
ELEVATOR MECHANIC	$ 48.93	37.335+a+b

PAID HOLIDAYS:

a. New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving, and Christmas Day.

b. Employer contributes 8% of regular hourly rate to vacation pay credit for employee who has worked in business more than 5 years; 6% for less than 5 years' service.

IRON0495-002 01/01/2021

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 27.35	17.30

LABO0016-002 06/01/2018

	Rates	Fringes
LABORER (Mason Tender - Cement/Concrete)	$ 17.25	6.01

PLAS0254-001 03/18/2021

	Rates	Fringes
PLASTERER	$ 23.56	9.39

PLUM0412-014 01/01/2022

	Rates	Fringes
PIPEFITTER	$ 36.40	13.90
PLUMBER (Includes HVAC Pipe		

Installation).....$ 36.40 13.90

SFNM0669-001 04/01/2021

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 32.67	23.21

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* SHEE0049-004 01/01/2023

	Rates	Fringes
Sheet Metal Worker (Including HVAC Duct and Unit Installation)	$ 35.44	18.42

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* SUNM2016-001 09/26/2018

	Rates	Fringes
CARPENTER (Form Work Only)	$ 20.41	6.25
CEMENT MASON/CONCRETE FINISHER	$ 18.59	7.45
GLAZIER	$ 20.15	3.48
LABORER: Common or General	$ 15.70 **	4.86
OPERATOR: Backhoe/Excavator/Trackhoe	$ 25.97	5.15
PAINTER (Brush and Roller)	$ 16.51	2.14
PAINTER: Spray	$ 16.51	2.14

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($16.20) or 13658 ($12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	N/A	N/A	N/A	Government
0002	N/A	N/A	N/A	Government

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	JUN 2020
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	MAY 2014
52.203-6	Restrictions On Subcontractor Sales To The Government	JUN 2020
52.203-7	Anti-Kickback Procedures	JUN 2020
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	MAY 2014
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	MAY 2014
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	JUN 2020
52.203-13	Contractor Code of Business Ethics and Conduct	NOV 2021
52.203-17	Contractor Employee Whistleblower Rights and Requirement To Inform Employees of Whistleblower Rights	JUN 2020
52.204-2 Alt II	Security Requirements (MAR 2021) - Alternate II	APR 1984
52.204-4	Printed or Copied Double-Sided on Postconsumer Fiber Content Paper	MAY 2011
52.204-9	Personal Identity Verification of Contractor Personnel	JAN 2011
52.204-10	Reporting Executive Compensation and First-Tier Subcontract Awards	JUN 2020
52.204-13	System for Award Management Maintenance	OCT 2018
52.204-18	Commercial and Government Entity Code Maintenance	AUG 2020
52.204-19	Incorporation by Reference of Representations and Certifications.	DEC 2014
52.204-21	Basic Safeguarding of Covered Contractor Information Systems	NOV 2021
52.204-23	Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab and Other Covered Entities	NOV 2021
52.204-25	Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment	NOV 2021
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	NOV 2021
52.209-9	Updates of Publicly Available Information Regarding Responsibility Matters	OCT 2018
52.209-10	Prohibition on Contracting With Inverted Domestic Corporations	NOV 2015

52.210-1	Market Research	NOV 2021
52.215-2	Audit and Records--Negotiation	JUN 2020
52.215-11 (Dev)	Price Reduction for Defective Certified Cost or Pricing Data--Modifications (DEVIATION 2022-O0001)	OCT 2021
52.215-13 (Dev)	Subcontractor Certified Cost or Pricing Data - Modifications (Deviation 2022-O0001)	OCT 2021
52.215-17	Waiver of Facilities Capital Cost of Money	OCT 1997
52.215-21	Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data -- Modifications	NOV 2021
52.219-4	Notice of Price Evaluation Preference for HUBZone Small Business Concerns	OCT 2022
52.219-8 (Dev)	Utilization of Small Business Concerns (Deviation 2023-O0002)	DEC 2022
52.219-16	Liquidated Damages-Subcontracting Plan	SEP 2021
52.222-1	Notice To The Government Of Labor Disputes	FEB 1997
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards - Overtime Compensation	MAY 2018
52.222-6	Construction Wage Rate Requirements	AUG 2018
52.222-7	Withholding of Funds	MAY 2014
52.222-8	Payrolls and Basic Records	JUL 2021
52.222-9	Apprentices and Trainees	JUL 2005
52.222-10	Compliance with Copeland Act Requirements	FEB 1988
52.222-11	Subcontracts (Labor Standards)	MAY 2014
52.222-12	Contract Termination-Debarment	MAY 2014
52.222-13	Compliance With Construction Wage Rate Requirements and Related Regulations	MAY 2014
52.222-14	Disputes Concerning Labor Standards	FEB 1988
52.222-15	Certification of Eligibility	MAY 2014
52.222-21	Prohibition Of Segregated Facilities	APR 2015
52.222-26	Equal Opportunity	SEP 2016
52.222-27	Affirmative Action Compliance Requirements for Construction	APR 2015
52.222-37	Employment Reports on Veterans	JUN 2020
52.222-40	Notification of Employee Rights Under the National Labor Relations Act	DEC 2010
52.222-50	Combating Trafficking in Persons	NOV 2021
52.222-54	Employment Eligibility Verification	MAY 2022
52.223-2	Affirmative Procurement of Biobased Products Under Service and Construction Contracts	SEP 2013
52.223-5	Pollution Prevention and Right-to-Know Information	MAY 2011
52.223-6	Drug-Free Workplace	MAY 2001
52.223-10	Waste Reduction Program	MAY 2011
52.223-15	Energy Efficiency in Energy-Consuming Products	MAY 2020
52.223-16 Alt I	Acquisition of EPEAT - Registered Personal Computer Products - Alternate I	JUN 2014
52.223-17	Affirmative Procurement of EPA-Designated Items in Service and Construction Contracts	AUG 2018
52.223-18	Encouraging Contractor Policies To Ban Text Messaging While Driving	JUN 2020
52.223-20	Aerosols	JUN 2016
52.223-21	Foams	JUN 2016
52.225-13	Restrictions on Certain Foreign Purchases	FEB 2021
52.226-1	Utilization Of Indian Organizations And Indian-Owned Economic Enterprises	JUN 2000

52.227-1	Authorization and Consent	JUN 2020
52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	JUN 2020
52.227-4	Patent Indemnity-Construction Contracts	DEC 2007
52.228-2	Additional Bond Security	OCT 1997
52.228-5	Insurance - Work On A Government Installation	JAN 1997
52.228-11 (Dev)	Individual Surety--Pledge of Assets (DEVIATION 2020-O0016)	FEB 2021
52.228-12	Prospective Subcontractor Requests for Bonds	DEC 2022
52.228-15 (Dev)	Performance and Payment Bonds-Construction. (Deviation 2020-O0016)	JUN 2020
52.229-3	Federal, State And Local Taxes	FEB 2013
52.232-5	Payments under Fixed-Price Construction Contracts	MAY 2014
52.232-17	Interest	MAY 2014
52.232-23 Alt I	Assignment of Claims (May 2014) - Alternate I	APR 1984
52.232-27	Prompt Payment for Construction Contracts	JAN 2017
52.232-33	Payment by Electronic Funds Transfer--System for Award Management	OCT 2018
52.233-1	Disputes	MAY 2014
52.233-3	Protest After Award	AUG 1996
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.236-2	Differing Site Conditions	APR 1984
52.236-3	Site Investigation and Conditions Affecting the Work	APR 1984
52.236-5	Material and Workmanship	APR 1984
52.236-6	Superintendence by the Contractor	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-8	Other Contracts	APR 1984
52.236-9	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements	APR 1984
52.236-10	Operations and Storage Areas	APR 1984
52.236-11	Use and Possession Prior to Completion	APR 1984
52.236-12	Cleaning Up	APR 1984
52.236-13	Accident Prevention	NOV 1991
52.236-14	Availability and Use of Utility Services	APR 1984
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-16	Quantity Surveys	APR 1984
52.236-17	Layout of Work	APR 1984
52.236-21 Alt I	Specifications and Drawings for Construction (Feb 1997) - Alternate I	APR 1984
52.236-26	Preconstruction Conference	FEB 1995
52.242-5	Payments to Small Business Subcontractors	JAN 2017
52.242-13	Bankruptcy	JUL 1995
52.242-14	Suspension of Work	APR 1984
52.243-4	Changes	JUN 2007
52.244-5	Competition In Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Products and Commercial Services	MAR 2023
52.246-12	Inspection of Construction	AUG 1996
52.246-21	Warranty of Construction	MAR 1994
52.247-34	F.O.B. Destination	NOV 1991
52.248-3 Alt I	Value Engineering-Construction (OCT 2020) - Alternate I	APR 1984
52.249-2 Alt I	Termination for Convenience of the Government (Fixed-Price) (Apr 2012) - Alternate I	SEP 1996
52.249-10	Default (Fixed-Price Construction)	APR 1984
52.253-1	Computer Generated Forms	JAN 1991

252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7000	Requirements Relating to Compensation of Former DoD Officials	SEP 2011
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	JAN 2023
252.203-7002	Requirement to Inform Employees of Whistleblower Rights	DEC 2022
252.203-7003	Agency Office of the Inspector General	AUG 2019
252.203-7005	Representation Relating to Compensation of Former DoD Officials	SEP 2022
252.204-7000	Disclosure Of Information	OCT 2016
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004	Antiterrorism Awareness Training for Contractors	JAN 2023
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Country that is a State Sponsor of Terrorism	MAY 2019
252.219-7003	Small Business Subcontracting Plan (DOD Contracts)	DEC 2019
252.223-7001	Hazard Warning Labels	DEC 1991
252.223-7004	Drug Free Work Force	SEP 1988
252.223-7006	Prohibition On Storage, Treatment, and Disposal of Toxic or Hazardous Materials	SEP 2014
252.223-7008	Prohibition of Hexavalent Chromium	JAN 2023
252.225-7001	Buy American And Balance Of Payments Program--Basic	JAN 2023
252.225-7002	Qualifying Country Sources As Subcontractors	MAR 2022
252.225-7012	Preference For Certain Domestic Commodities	APR 2022
252.225-7017	Photovoltaic Devices	DEC 2022
252.227-7033	Rights in Shop Drawings	APR 1966
252.232-7003	Electronic Submission of Payment Requests and Receiving Reports	DEC 2018
252.232-7010	Levies on Contract Payments	DEC 2006
252.236-7000	Modification Proposals-Price Breakdown	DEC 1991
252.236-7013	Requirement for Competition Opportunity for American Steel Producers, Fabricators, and Manufacturers	JAN 2023
252.243-7002	Requests for Equitable Adjustment	DEC 2022
252.244-7000	Subcontracts for Commercial Products or Commercial Services	JAN 2023
252.247-7023	Transportation of Supplies by Sea	JAN 2023

CLAUSES INCORPORATED BY FULL TEXT

52.203-19 PROHIBITION ON REQUIRING CERTAIN INTERNAL CONFIDENTIALITY AGREEMENTS OR STATEMENTS (JAN 2017)

(a) Definitions. As used in this clause--

Internal confidentiality agreement or statement means a confidentiality agreement or any other written statement that the contractor requires any of its employees or subcontractors to sign regarding nondisclosure of contractor information, except that it does not include confidentiality agreements arising out of civil litigation or confidentiality agreements that contractor employees or subcontractors sign at the behest of a Federal agency.

Subcontract means any contract as defined in subpart 2.1 entered into by a subcontractor to furnish supplies or services for performance of a prime contract or a subcontract. It includes but is not limited to purchase orders, and changes and modifications to purchase orders.

Subcontractor means any supplier, distributor, vendor, or firm (including a consultant) that furnishes supplies or services to or for a prime contractor or another subcontractor.

(b) The Contractor shall not require its employees or subcontractors to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting waste, fraud, or abuse related to the performance of a Government contract to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information (e.g., agency Office of the Inspector General).
(c) The Contractor shall notify current employees and subcontractors that prohibitions and restrictions of any preexisting internal confidentiality agreements or statements covered by this clause, to the extent that such prohibitions and restrictions are inconsistent with the prohibitions of this clause, are no longer in effect.
(d) The prohibition in paragraph (b) of this clause does not contravene requirements applicable to Standard Form 312 (Classified Information Nondisclosure Agreement), Form 4414 (Sensitive Compartmented Information Nondisclosure Agreement), or any other form issued by a Federal department or agency governing the nondisclosure of classified information.
(e) In accordance with section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015, (Pub. L. 113-235), and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions) use of funds appropriated (or otherwise made available) is prohibited, if the Government determines that the Contractor is not in compliance with the provisions of this clause.
(f) The Contractor shall include the substance of this clause, including this paragraph (f), in subcontracts under such contracts.

(End of clause)

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 570 days (645 days is bid option 1 is exercised). The time stated for completion shall include final cleanup of the premises.

SCHEDULE

Item of Work	Commencement Time in Calendar Days After Receipt of Notice to Proceed	Completion Time in Calendar Days After Receipt of Notice to Proceed
BASE BID		
(1) VA NRM Repair-Replace Elevators in B-41	10	570
BID OPTION NO. 1		
(2) Provide New Car enclosure for Service Elevators S-2 and S-3, see Section 01 01 01 for information)		If this bid option is exercised, an additional 75 calendar days will be added to the total Completion Time which includes the base bid and exercised bid options.

1. If Bid Option No. 1 is exercised, the Base Bid Completion Time will be increased an additional 75 calendar days for a total Completion Time of 645 calendar days.

2. Total Completion Time is defined as the Completion Time in calendar days stated for the base bid plus the additional calendar days for completion associated with any exercised bid option(s). The total completion time is the time specified in the contract to complete the work.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount listed in the table under FAR 52.211-10: Commencement, Prosecution, and Completion of Work for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.217-7 OPTION FOR INCREASED QUANTITY--SEPARATELY PRICED LINE ITEM (MAR 1989)

The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated in the Schedule. The Contracting Officer may exercise the option by written notice to the Contractor within the performance period listed for the base tasks. Delivery of added items shall continue at the same rate that like items are called for under the contract, unless the parties otherwise agree.

(End of clause)

52.219-28 POST-AWARD SMALL BUSINESS PROGRAM REREPRESENTATION (OCT 2022)

(a) Definitions. As used in this clause--

Long-term contract means a contract of more than five years in duration, including options. However, the term does not include contracts that exceed five years in duration because the period of performance has been extended for a cumulative period not to exceed six months under the clause at 52.217-8, Option to Extend Services, or other appropriate authority.

Small business concern--

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (d) of this clause.

(2) Affiliates, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

(b) If the Contractor represented that it was any of the small business concerns identified in 19.000(a)(3) prior to award of this contract, the Contractor shall rerepresent its size and socioeconomic status according to paragraph (f) of this clause or, if applicable, paragraph (h) of this clause, upon occurrence of any of the following:

(1) Within 30 days after execution of a novation agreement or within 30 days after modification of the contract to include this clause, if the novation agreement was executed prior to inclusion of this clause in the contract.

(2) Within 30 days after a merger or acquisition that does not require a novation or within 30 days after modification of the contract to include this clause, if the merger or acquisition occurred prior to inclusion of this clause in the contract.

(3) For long-term contracts--

(i) Within 60 to 120 days prior to the end of the fifth year of the contract; and

(ii) Within 60 to 120 days prior to the date specified in the contract for exercising any option thereafter.

(c) If the Contractor represented that it was any of the small business concerns identified in 19.000(a)(3) prior to award of this contract, the Contractor shall rerepresent its size and socioeconomic status according to paragraph (f) of this clause or, if applicable, paragraph (h) of this clause, when the Contracting Officer explicitly requires it for an order issued under a multiple-award contract.

(d) The Contractor shall rerepresent its size status in accordance with the size standard in effect at the time of this rerepresentation that corresponds to the North American Industry Classification System (NAICS) code(s) assigned to this contract. The small business size standard corresponding to this NAICS code(s) can be found at https://www.sba.gov/document/support--table-size-standards.

(e) The small business size standard for a Contractor providing an end item that it does not manufacture, process, or produce itself, for a contract other than a construction or service contract, is 500 employees if the acquisition--

(1) Was set aside for small business and has a value above the simplified acquisition threshold;

(2) Used the HUBZone price evaluation preference regardless of dollar value, unless the Contractor waived the price evaluation preference; or

(3) Was an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(f) Except as provided in paragraph (h) of this clause, the Contractor shall make the representation(s) required by paragraph (b) and (c) of this clause by validating or updating all its representations in the Representations and Certifications section of the System for Award Management (SAM) and its other data in SAM, as necessary, to ensure that they reflect the Contractor's current status. The Contractor shall notify the contracting office in writing within the timeframes specified in paragraph (b) of this clause, or with its offer for an order (see paragraph (c) of this clause), that the data have been validated or updated, and provide the date of the validation or update.

(g) If the Contractor represented that it was other than a small business concern prior to award of this contract, the Contractor may, but is not required to, take the actions required by paragraphs (f) or (h) of this clause.

(h) If the Contractor does not have representations and certifications in SAM, or does not have a representation in SAM for the NAICS code applicable to this contract, the Contractor is required to complete the following rerepresentation and submit it to the contracting office, along with the contract number and the date on which the rerepresentation was completed:

(1) The Contractor represents that it [ ] is, [ ] is not a small business concern under NAICS Code 238290 assigned to contract number TBD.

(2) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not a women-owned small business concern.

(4) Women-owned small business (WOSB) joint venture eligible under the WOSB Program. The Contractor represents that it [ ] is, [ ] is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [The Contractor shall enter the name and unique entity identifier of each party to the joint venture: .]

(5) Economically disadvantaged women-owned small business (EDWOSB) joint venture. The Contractor represents that it [ ] is, [ ] is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [The Contractor shall enter the name and unique entity identifier of each party to the joint venture: .]

(6) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not a veteran-owned small business concern.

(7) [Complete only if the Contractor represented itself as a veteran-owned small business concern in paragraph (h)(6) of this clause.] The Contractor represents that it [ ] is, [ ] is not a service-disabled veteran-owned small business concern.

(8) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that--

(i) It [ ] is, [ ] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR part 126; and

(ii) It [ ] is, [ ] is not a HUBZone joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (h)(8)(i) of this clause is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The Contractor shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: .] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

[Contractor to sign and date and insert authorized signer's name and title.]

(End of clause)

52.222-35 EQUAL OPPORTUNITY FOR VETERANS (JUN 2020)

(a) Definitions. As used in this clause--

"Active duty wartime or campaign badge veteran," "Armed Forces service medal veteran," "disabled veteran," "protected veteran," "qualified disabled veteran," and "recently separated veteran" have the meanings given at Federal Acquisition Regulation (FAR) 22.1301.

(b) Equal opportunity clause. The Contractor shall abide by the requirements of the equal opportunity clause at 41 CFR 60-300.5(a), as of March 24, 2014. This clause prohibits discrimination against qualified protected veterans, and requires affirmative action by the Contractor to employ and advance in employment qualified protected veterans.

(c) Subcontracts. The Contractor shall insert the terms of this clause in subcontracts valued at or above the threshold specified in FAR 22.1303(a) on the date of subcontract award, unless exempted by rules, regulations, or orders of the Secretary of Labor. The Contractor shall act as specified by the Director, Office of Federal Contract Compliance Programs, to enforce the terms, including action for noncompliance. Such necessary changes in language may be made as shall be appropriate to identify properly the parties and their undertakings.

(End of clause)

52.222-36 EQUAL OPPORTUNITY FOR WORKERS WITH DISABILITIES (JUN 2020)

(a) Equal opportunity clause. The Contractor shall abide by the requirements of the equal opportunity clause at 41 CFR 60-741.5(a), as of March 24, 2014. This clause prohibits discrimination against qualified individuals on the basis of disability, and requires affirmative action by the Contractor to employ and advance in employment qualified individuals with disabilities.

(b) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of the threshold specified in Federal Acquisition Regulation (FAR) 22.1408(a) on the date of subcontract award, unless exempted by rules, regulations, or orders of the Secretary, so that such provisions will be binding upon each subcontractor or vendor. The Contractor shall act as specified by the Director, Office of Federal Contract Compliance Programs of the U.S. Department of Labor, to enforce the terms, including action for noncompliance. Such necessary changes in language may be made as shall be appropriate to identify properly the parties and their undertakings.

(End of clause)

52.222-55 MINIMUM WAGES FOR CONTRACTOR WORKERS UNDER EXECUTIVE ORDER 14026 (JAN 2022)

(a) Definitions. As used in this clause--

"United States" means the 50 states, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, Johnston Island, Wake Island, and the outer Continental Shelf as defined in the Outer Continental Shelf Lands Act (43 U.S.C. 1331, et seq.).

"Worker"--

(1) (i) Means any person engaged in performing work on, or in connection with, a contract covered by Executive Order 14026, and --

(A) Whose wages under such contract are governed by the Fair Labor Standards Act (29 U.S.C. chapter 8), the Service Contract Labor Standards statute (41 U.S.C. chapter 67), or the Wage Rate Requirements (Construction) statute (40 U.S.C. chapter 31, subchapter IV);

(B) Other than individuals employed in a bona fide executive, administrative, or professional capacity, as those terms are defined in 29 CFR part 541;

(C) Regardless of the contractual relationship alleged to exist between the individual and the employer.

(ii) Includes workers performing on, or in connection with, the contract whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(c).

(iii) Also includes any person working on, or in connection with, the contract and individually registered in a bona fide apprenticeship or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship.

(2)(i) A worker performs on a contract if the worker directly performs the specific services called for by the contract; and

(ii) A worker performs in connection with a contract if the worker's work activities are necessary to the performance of a contract but are not the specific services called for by the contract.

(b) Executive Order minimum wage rate.

(1) The Contractor shall pay to workers, while performing in the United States, and performing on, or in connection with, this contract, a minimum hourly wage rate of $15.00 per hour beginning January 30, 2022.

(2) The Contractor shall adjust the minimum wage paid, if necessary, beginning January 1, 2023, and annually thereafter, to meet the applicable annual E.O. minimum wage. The Administrator of the Department of Labor's Wage and Hour Division (the Administrator) will publish annual determinations in the Federal Register no later than 90 days before the effective date of the new E.O. minimum wage rate. The Administrator will also publish the applicable E.O. minimum wage on https://www.sam.gov (or any successor Web site), and a general notice on all wage determinations issued under the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, that will provide information on the E.O. minimum wage and how to obtain annual updates. The applicable published E.O. minimum wage is incorporated by reference into this contract.

(3)(i) The Contractor may request a price adjustment only after the effective date of the new annual E.O. minimum wage determination. Prices will be adjusted only for increased labor costs (including subcontractor labor costs) as a result of an increase in the annual E.O. minimum wage, and for associated labor costs (including those for subcontractors). Associated labor costs shall include increases or decreases that result from changes in social security and unemployment taxes and workers' compensation insurance, but will not otherwise include any amount for general and administrative costs, overhead, or profit.

(ii) Subcontractors may be entitled to adjustments due to the new minimum wage, pursuant to paragraph (b)(2). Contractors shall consider any subcontractor requests for such price adjustment.

(iii) The Contracting Officer will not adjust the contract price under this clause for any costs other than those identified in paragraph (b)(3)(i) of this clause, and will not provide duplicate price adjustments with any price adjustment under clauses implementing the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute.

(4) The Contractor warrants that the prices in this contract do not include allowance for any contingency to cover increased costs for which adjustment is provided under this clause.

(5) A pay period under this clause may not be longer than semi-monthly, but may be shorter to comply with any applicable law or other requirement under this contract establishing a shorter pay period. Workers shall be paid no later than one pay period following the end of the regular pay period in which such wages were earned or accrued.

(6) The Contractor shall pay, unconditionally to each worker, all wages due free and clear without subsequent rebate or kickback. The Contractor may make deductions that reduce a worker's wages below the E.O. minimum wage rate only if done in accordance with 29 CFR 23.230, Deductions.

(7) The Contractor shall not discharge any part of its minimum wage obligation under this clause by furnishing fringe benefits or, with respect to workers whose wages are governed by the Service Contract Labor Standards statute, the cash equivalent thereof.

(8) Nothing in this clause shall excuse the Contractor from compliance with any applicable Federal or State prevailing wage law or any applicable law or municipal ordinance or any applicable contract establishing a minimum wage higher than the E.O. 14026 minimum wage. However, wage increases under such other laws or municipal ordinances are not subject to price adjustment under this subpart.

(9) The Contractor shall pay the E.O. minimum wage rate whenever it is higher than any applicable collective bargaining agreement(s) wage rate.

(10) The Contractor shall follow the policies and procedures in 29 CFR 23.240(b) and 23.280 for treatment of workers engaged in an occupation in which they customarily and regularly receive more than $30 a month in tips.

(c)(1) This clause applies to workers as defined in paragraph (a). As provided in that definition--

(i) Workers are covered regardless of the contractual relationship alleged to exist between the contractor or subcontractor and the worker;

(ii) Workers with disabilities whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(c) are covered; and

(iii) Workers who are registered in a bona fide apprenticeship program or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship, are covered.

(2) This clause does not apply to--

(i) Fair Labor Standards Act (FLSA)-covered individuals performing in connection with contracts covered by the E.O., i.e. those individuals who perform duties necessary to the performance of the contract, but who are not directly engaged in performing the specific work called for by the contract, and who spend less than 20 percent of their hours worked in a particular workweek performing in connection with such contracts;

(ii) Individuals exempted from the minimum wage requirements of the FLSA under 29 U.S.C. 213(a) and 214(a) and (b), unless otherwise covered by the Service Contract Labor Standards statute, or the Wage Rate Requirements (Construction) statute. These individuals include but are not limited to--

(A) Learners, apprentices, or messengers whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(a);

(B) Students whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(b); and

(C) Those employed in a bona fide executive, administrative, or professional capacity (29 U.S.C. 213(a)(1) and 29 CFR part 541).

(d) Notice. The Contractor shall notify all workers performing work on, or in connection with, this contract of the applicable E.O. minimum wage rate under this clause. With respect to workers covered by the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, the Contractor may meet this requirement by posting, in a prominent and accessible place at the worksite, the applicable wage determination under those statutes. With respect to workers whose wages are governed by the FLSA, the Contractor shall post notice, utilizing the poster provided by the Administrator, which can be obtained at www.dol.gov/agencies/whd/government-contracts, in a prominent and accessible place at the worksite. Contractors that customarily post notices to workers electronically may post the notice electronically provided the electronic posting is displayed prominently on any Web site that is maintained by the contractor, whether external or internal, and customarily used for notices to workers about terms and conditions of employment.

(e) Payroll Records. (1) The Contractor shall make and maintain records, for three years after completion of the work, containing the following information for each worker:

(i) Name, address, and social security number;

(ii) The worker's occupation(s) or classification(s);

(iii) The rate or rates of wages paid;

(iv) The number of daily and weekly hours worked by each worker;

(v) Any deductions made; and

(vi) Total wages paid.

(2) The Contractor shall make records pursuant to paragraph (e)(1) of this clause available for inspection and transcription by authorized representatives of the Administrator. The Contractor shall also make such records available upon request of the Contracting Officer.

(3) The Contractor shall make a copy of the contract available, as applicable, for inspection or transcription by authorized representatives of the Administrator.

(4) Failure to comply with this paragraph (e) shall be a violation of 29 CFR 23.260 and this contract. Upon direction of the Administrator or upon the Contracting Officer's own action, payment shall be withheld until such time as the noncompliance is corrected.

(5) Nothing in this clause limits or otherwise modifies the Contractor's payroll and recordkeeping obligations, if any, under the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, the Fair Labor Standards Act, or any other applicable law.

(f) Access. The Contractor shall permit authorized representatives of the Administrator to conduct investigations, including interviewing workers at the worksite during normal working hours.

(g) Withholding. The Contracting Officer, upon his or her own action or upon written request of the Administrator, will withhold funds or cause funds to be withheld, from the Contractor under this or any other Federal contract with the same Contractor, sufficient to pay workers the full amount of wages required by this clause.

(h) Disputes. Department of Labor has set forth in 29 CFR 23.510, Disputes concerning contractor compliance, the procedures for resolving disputes concerning a contractor's compliance with Department of Labor regulations at 29

CFR part 23. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. These disputes include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the Department of Labor, or the workers or their representatives.

(i) Antiretaliation. The Contractor shall not discharge or in any other manner discriminate against any worker because such worker has filed any complaint or instituted or caused to be instituted any proceeding under or related to compliance with the E.O. or this clause, or has testified or is about to testify in any such proceeding.

(j) Subcontractor compliance. The Contractor is responsible for subcontractor compliance with the requirements of this clause and may be held liable for unpaid wages due subcontractor workers.

(k) Subcontracts. The Contractor shall include the substance of this clause, including this paragraph (k) in all subcontracts, regardless of dollar value, that are subject to the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, and are to be performed in whole or in part in the United States.

(End of clause)

52.222-62 PAID SICK LEAVE UNDER EXECUTIVE ORDER 13706 (JAN 2022)

(a) Definitions. As used in this clause (in accordance with 29 CFR 13.2)--

Child, domestic partner, and domestic violence have the meaning given in 29 CFR 13.2.

Employee--(1)(i) Means any person engaged in performing work on or in connection with a contract covered by Executive Order (E.O.) 13706; and

(A) Whose wages under such contract are governed by the Service Contract Labor Standards statute (41 U.S.C. chapter 67), the Wage Rate Requirements (Construction) statute (40 U.S.C. chapter 31, subchapter IV), or the Fair Labor Standards Act (29 U.S.C. chapter 8);

(B) Including employees who qualify for an exemption from the Fair Labor Standards Act's minimum wage and overtime provisions;

(C) Regardless of the contractual relationship alleged to exist between the individual and the employer; and

(ii) Includes any person performing work on or in connection with the contract and individually registered in a bona fide apprenticeship or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship.

(2)(i) An employee performs "on" a contract if the employee directly performs the specific services called for by the contract; and

(ii) An employee performs "in connection with" a contract if the employee's work activities are necessary to the performance of a contract but are not the specific services called for by the contract.

Individual related by blood or affinity whose close association with the employee is the equivalent of a family relationship has the meaning given in 29 CFR 13.2.

Multiemployer plan means a plan to which more than one employer is required to contribute and which is maintained pursuant to one or more collective bargaining agreements between one or more employee

organizations and more than one employer.

Paid sick leave means compensated absence from employment that is required by E.O. 13706 and 29 CFR part 13.

Parent, sexual assault, spouse, and stalking have the meaning given in 29 CFR 13.2.

United States means the 50 States and the District of Columbia.

(b) Executive Order 13706. (1) This contract is subject to E.O. 13706 and the regulations issued by the Secretary of Labor in 29 CFR part 13 pursuant to the E.O.

(2) If this contract is not performed wholly within the United States, this clause only applies with respect to that part of the contract that is performed within the United States.

(c) Paid sick leave. The Contractor shall--

(1) Permit each employee engaged in performing work on or in connection with this contract to earn not less than 1 hour of paid sick leave for every 30 hours worked;

(2) Allow accrual and use of paid sick leave as required by E.O. 13706 and 29 CFR part 13;

(3) Comply with the accrual, use, and other requirements set forth in 29 CFR 13.5 and 13.6, which are incorporated by reference in this contract;

(4) Provide paid sick leave to all employees when due free and clear and without subsequent deduction (except as otherwise provided by 29 CFR 13.24), rebate, or kickback on any account;

(5) Provide pay and benefits for paid sick leave used no later than one pay period following the end of the regular pay period in which the paid sick leave was taken; and

(6) Be responsible for the compliance by any subcontractor with the requirements of E.O. 13706, 29 CFR part 13, and this clause.

(d) Contractors may fulfill their obligations under E.O. 13706 and 29 CFR part 13 jointly with other contractors through a multiemployer plan, or may fulfill their obligations through an individual fund, plan, or program (see 29 CFR 13.8).

(e) Withholding. The Contracting Officer will, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this or any other Federal contract with the same Contractor, so much of the accrued payments or advances as may be considered necessary to pay employees the full amount owed to compensate for any violation of the requirements of E.O. 13706, 29 CFR part 13, or this clause, including--

(1) Any pay and/or benefits denied or lost by reason of the violation;

(2) Other actual monetary losses sustained as a direct result of the violation; and

(3) Liquidated damages.

(f) Payment suspension/contract termination/contractor debarment. (1) In the event of a failure to comply with E.O. 13706, 29 CFR part 13, or this clause, the contracting agency may, on its own action or after authorization or by direction of the Department of Labor and written notification to the Contractor take action to cause suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(2) Any failure to comply with the requirements of this clause may be grounds for termination for default or cause.

(3) A breach of the contract clause may be grounds for debarment as a contractor and subcontractor as provided in 29 CFR 13.52.

(g) The paid sick leave required by E.O. 13706, 29 CFR part 13, and this clause is in addition to the Contractor's obligations under the Service Contract Labor Standards statute and Wage Rate Requirements (Construction) statute, and the Contractor may not receive credit toward its prevailing wage or fringe benefit obligations under those Acts for any paid sick leave provided in satisfaction of the requirements of E.O. 13706 and 29 CFR part 13.

(h) Nothing in E.O. 13706 or 29 CFR part 13 shall excuse noncompliance with or supersede any applicable Federal or State law, any applicable law or municipal ordinance, or a collective bargaining agreement requiring greater paid sick leave or leave rights than those established under E.O. 13706 and 29 CFR part 13.

(i) Recordkeeping. (1) The Contractor shall make and maintain, for no less than three (3) years from the completion of the work on the contract, records containing the following information for each employee, which the Contractor shall make available upon request for inspection, copying, and transcription by authorized representatives of the Administrator of the Wage and Hour Division of the Department of Labor:

(i) Name, address, and social security number of each employee.

(ii) The employee's occupation(s) or classification(s).

(iii) The rate or rates of wages paid (including all pay and benefits provided).

(iv) The number of daily and weekly hours worked.

(v) Any deductions made.

(vi) The total wages paid (including all pay and benefits provided) each pay period.

(vii) A copy of notifications to employees of the amount of paid sick leave the employee has accrued, as required under 29 CFR 13.5(a)(2).

(viii) A copy of employees' requests to use paid sick leave, if in writing, or, if not in writing, any other records reflecting such employee requests.

(ix) Dates and amounts of paid sick leave taken by employees (unless the Contractor's paid time off policy satisfies the requirements of E.O. 13706 and 29 CFR part 13 as described in 29 CFR 13.5(f)(5), leave shall be designated in records as paid sick leave pursuant to E.O. 13706).

(x) A copy of any written responses to employees' requests to use paid sick leave, including explanations for any denials of such requests, as required under 29 CFR 13.5(d)(3).

(xi) Any records reflecting the certification and documentation the Contractor may require an employee to provide under 29 CFR 13.5(e), including copies of any certification or documentation provided by an employee.

(xii) Any other records showing any tracking of or calculations related to an employee's accrual or use of paid sick leave.

(xiii) The relevant contract.

(xiv) The regular pay and benefits provided to an employee for each use of paid sick leave.

(xv) Any financial payment made for unused paid sick leave upon a separation from employment intended, pursuant to 29 CFR 13.5(b)(5), to relieve the Contractor from the obligation to reinstate such paid sick leave as otherwise required by 29 CFR 13.5(b)(4).

(2)(i) If the Contractor wishes to distinguish between an employee's covered and noncovered work, the Contractor shall keep records or other proof reflecting such distinctions. Only if the Contractor adequately segregates the employee's time will time spent on noncovered work be excluded from hours worked counted toward the accrual of paid sick leave. Similarly, only if the Contractor adequately segregates the employee's time may the Contractor properly refuse an employee's request to use paid sick leave on the ground that the employee was scheduled to perform noncovered work during the time he or she asked to use paid sick leave.

(ii) If the Contractor estimates covered hours worked by an employee who performs work in connection with contracts covered by the E.O. pursuant to 29 CFR 13.5(a)(1)(i) or (iii), the Contractor shall keep records or other proof of the verifiable information on which such estimates are reasonably based. Only if the Contractor relies on an estimate that is reasonable and based on verifiable information will an employee's time spent in connection with noncovered work be excluded from hours worked counted toward the accrual of paid sick leave. If the Contractor estimates the amount of time an employee spends performing in connection with contracts covered by the E.O., the Contractor shall permit the employee to use his or her paid sick leave during any work time for the Contractor.

(3) In the event the Contractor is not obligated by the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, or the Fair Labor Standards Act to keep records of an employee's hours worked, such as because the employee is exempt from the Fair Labor Standards Act's minimum wage and overtime requirements, and the Contractor chooses to use the assumption permitted by 29 CFR 13.5(a)(1)(iii), the Contractor is excused from the requirement in paragraph (i)(1)(iv) of this clause and 29 CFR 13.25(a)(4) to keep records of the employee's number of daily and weekly hours worked.

(4)(i) Records relating to medical histories or domestic violence, sexual assault, or stalking, created for purposes of E.O. 13706, whether of an employee or an employee's child, parent, spouse, domestic partner, or other individual related by blood or affinity whose close association with the employee is the equivalent of a family relationship, shall be maintained as confidential records in separate files/records from the usual personnel files.

(ii) If the confidentiality requirements of the Genetic Information Nondiscrimination Act of 2008 (GINA), section 503 of the Rehabilitation Act of 1973, and/or the Americans with Disabilities Act (ADA) apply to records or documents created to comply with the recordkeeping requirements in this contract clause, the records and documents shall also be maintained in compliance with the confidentiality requirements of the GINA, section 503 of the Rehabilitation Act of 1973, and/or ADA as described in 29 CFR 1635.9, 41 CFR 60-741.23(d), and 29 CFR 1630.14(c)(1), respectively.

(iii) The Contractor shall not disclose any documentation used to verify the need to use 3 or more consecutive days of paid sick leave for the purposes listed in 29 CFR 13.5(c)(1)(iv) (as described in 29 CFR 13.5(e)(1)(ii)) and shall maintain confidentiality about any domestic abuse, sexual assault, or stalking, unless the employee consents or when disclosure is required by law.

(5) The Contractor shall permit authorized representatives of the Wage and Hour Division to conduct interviews with employees at the worksite during normal working hours.

(6) Nothing in this contract clause limits or otherwise modifies the Contractor's recordkeeping obligations, if any, under the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, the Fair Labor Standards Act, the Family and Medical Leave Act, E.O. 14026, their respective implementing regulations, or any other applicable law.

(j) Interference/discrimination.

(1) The Contractor shall not in any manner interfere with an employee's accrual or use of paid sick leave as required by E.O. 13706 or 29 CFR part 13. Interference includes, but is not limited to--

(i) Miscalculating the amount of paid sick leave an employee has accrued;

(ii) Denying or unreasonably delaying a response to a proper request to use paid sick leave;

(iii) Discouraging an employee from using paid sick leave;

(iv) Reducing an employee's accrued paid sick leave by more than the amount of such leave used;

(v) Transferring an employee to work on contracts not covered by the E.O. to prevent the accrual or use of paid sick leave;

(vi) Disclosing confidential information contained in certification or other documentation provided to verify the need to use paid sick leave; or

(vii) Making the use of paid sick leave contingent on the employee's finding a replacement worker or the fulfillment of the Contractor's operational needs.

(2) The Contractor shall not discharge or in any other manner discriminate against any employee for--

(i) Using, or attempting to use, paid sick leave as provided for under E.O. 13706 and 29 CFR part 13;

(ii) Filing any complaint, initiating any proceeding, or otherwise asserting any right or claim under E.O. 13706 and 29 CFR part 13;

(iii) Cooperating in any investigation or testifying in any proceeding under E.O. 13706 and 29 CFR part 13; or

(iv) Informing any other person about his or her rights under E.O. 13706 and 29 CFR part 13.

(k) Notice. The Contractor shall notify all employees performing work on or in connection with a contract covered by the E.O. of the paid sick leave requirements of E.O. 13706, 29 CFR part 13, and this clause by posting a notice provided by the Department of Labor in a prominent and accessible place at the worksite so it may be readily seen by employees. Contractors that customarily post notices to employees electronically may post the notice electronically, provided such electronic posting is displayed prominently on any Web site that is maintained by the Contractor, whether external or internal, and customarily used for notices to employees about terms and conditions of employment.

(l) Disputes concerning labor standards. Disputes related to the application of E.O. 13706 to this contract shall not be subject to the general disputes clause of the contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR part 13. Disputes within the meaning of this contract clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the Department of Labor, or the employees or their representatives.

(m) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (m), in all subcontracts, regardless of dollar value, that are subject to the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, and are to be performed in whole or in part in the United States.

(End of clause)

52.223-3 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA (FEB 2021)

(a) "Hazardous material", as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).

(b) The offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Material Safety Data Sheet submitted under this contract.

Material (if none, insert None)	Identification No.
___	___
___	___
___	___

(c) This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.

(d) The apparently successful offeror agrees to submit, for each item as required prior to award, a Material Safety Data Sheet, meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous material identified in paragraph (b) of this clause. Data shall be submitted in accordance with Federal Standard No. 313, whether or not the apparently successful offeror is the actual manufacturer of these items. Failure to submit the Material Safety Data Sheet prior to award may result in the apparently successful offeror being considered nonresponsible and ineligible for award.

(e) If, after award, there is a change in the composition of the item(s) or a revision to Federal Standard No. 313, which renders incomplete or inaccurate the data submitted under paragraph (d) of this clause, the Contractor shall promptly notify the Contracting Officer and resubmit the data.

(f) Neither the requirements of this clause nor any act or failure to act by the Government shall relieve the Contractor of any responsibility or liability for the safety of Government, Contractor, or subcontractor personnel or property.

(g) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, State, and local laws, codes, ordinances, and regulations (including the obtaining of licenses and permits) in connection with hazardous material.

(h) The Government's rights in data furnished under this contract with respect to hazardous material are as follows:

(1) To use, duplicate and disclose any data to which this clause is applicable. The purposes of this right are to--

(i) Apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of hazardous materials;

(ii) Obtain medical treatment for those affected by the material; and

(iii) Have others use, duplicate, and disclose the data for the Government for these purposes.

(2) To use, duplicate, and disclose data furnished under this clause, in accordance with subparagraph (h)(1) of this

clause, in precedence over any other clause of this contract providing for rights in data.

(3) The Government is not precluded from using similar or identical data acquired from other sources.

(End of clause)

52.223-9 ESTIMATE OF PERCENTAGE OF RECOVERED MATERIAL CONTENT FOR EPA-DESIGNATED ITEMS (MAY 2008)

(a) Definitions. As used in this clause--

Postconsumer material means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of “recovered material.”

Recovered material means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

(b) The Contractor, on completion of this contract, shall--

(1) Estimate the percentage of the total recovered material content for EPA-designated item(s) delivered and/or used in contract performance, including, if applicable, the percentage of post-consumer material content; and

(2) Submit this estimate to (Contracting Officer complete in accordance with agency procedures).

(End of clause)

52.225-9 BUY AMERICAN—CONSTRUCTION MATERIALS (OCT 2022)

(a) Definitions. As used in this clause--

Commercially available off-the-shelf (COTS) item—

(1) Means any item of supply (including construction material) that is--

(i) A commercial product (as defined in paragraph (1) of the definition of "commercial product" at Federal Acquisition Regulation (FAR) 2.101);

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, under a contract or subcontract at any tier, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4) such as agricultural products and petroleum products.

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or a subcontractor for incorporation into the building or work. The term also includes an item brought to the site

preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the construction material.

Critical component means a component that is mined, produced, or manufactured in the United States and deemed critical to the U.S. supply chain. The list of critical components is at FAR 25.105.

Critical item means a domestic construction material or domestic end product that is deemed critical to U.S. supply chain resiliency. The list of critical items is at FAR 25.105.

Domestic construction material means--

(1) For construction material that does not consist wholly or predominantly of iron or steel or a combination of both-

(i) An unmanufactured construction material mined or produced in the United States; or

(ii) A construction material manufactured in the United States, if--

(A) The cost of its components mined, produced, or manufactured in the United States exceeds 60 percent of the cost of all its components, except that the percentage will be 65 percent for items delivered in calendar years 2024 through 2028 and 75 percent for items delivered starting in calendar year 2029. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic. Components of unknown origin are treated as foreign; or

(B) The construction material is a COTS item; or

(2) For construction material that consists wholly or predominantly of iron or steel or a combination of both, a construction material manufactured in the United States if the cost of foreign iron and steel constitutes less than 5 percent of the cost of all components used in such construction material. The cost of foreign iron and steel includes but is not limited to the cost of foreign iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the construction material and a good faith estimate of the cost of all foreign iron or steel components excluding COTS fasteners. Iron or steel components of unknown origin are treated as foreign. If the construction material contains multiple components, the cost of all the materials used in such construction material is calculated in accordance with the definition of "cost of components".

Fastener means a hardware device that mechanically joins or affixes two or more objects together. Examples of fasteners are nuts, bolts, pins, rivets, nails, clips, and screws.

Foreign construction material means a construction material other than a domestic construction material.

Foreign iron and steel means iron or steel products not produced in the United States. Produced in the United States means that all manufacturing processes of the iron or steel must take place in the United States, from the initial

melting stage through the application of coatings, except metallurgical processes involving refinement of steel additives. The origin of the elements of the iron or steel is not relevant to the determination of whether it is domestic or foreign.

Predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of iron or steel components excluding COTS fasteners.

Steel means an alloy that includes at least 50 percent iron, between 0.02 and 2 percent carbon, and may include other elements.

United States means the 50 States, the District of Columbia, and outlying areas.

(b) Domestic preference.

(1) This clause implements 41 U.S.C. chapter 83, Buy American, by providing a preference for domestic construction material. In accordance with 41 U.S.C. 1907, the domestic content test of the Buy American statute is waived for construction material that is a COTS item, except that for construction material that consists wholly or predominantly of iron or steel or a combination of both, the domestic content test is applied only to the iron and steel content of the construction materials, excluding COTS fasteners. (See FAR 12.505(a)(2)). The Contractor shall use only domestic construction material in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) This requirement does not apply to information technology that is a commercial product or to the construction materials or components listed by the Government as follows:

NONE

(3) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(2) of this clause if the Government determines that

(i) The cost of domestic construction material would be unreasonable.

(A) For domestic construction material that is not a critical item or does not contain critical components.

(1) The cost of a particular domestic construction material subject to the requirements of the Buy American statute is unreasonable when the cost of such material exceeds the cost of foreign material by more than 20 percent;

(2) For construction material that is not a COTS item and does not consist wholly or predominantly of iron or steel or a combination of both, if the cost of a particular domestic construction material is determined to be unreasonable or there is no domestic offer received, and the low offer is for foreign construction material that is manufactured in the United States and does not exceed 55 percent domestic content, the Contracting Officer will treat the lowest offer of foreign construction material that exceeds 55 percent domestic content as a domestic offer and determine whether the cost of that offer is unreasonable by applying the evaluation factor listed in paragraph (b)(3)(i)(A)(1) of this clause.

(3) The procedures in paragraph (b)(3)(i)(A)(2) of this clause will no longer apply as of January 1, 2030.

(B) For domestic construction material that is a critical item or contains critical components.

(1) The cost of a particular domestic construction material that is a critical item or contains critical components, subject to the requirements of the Buy American statute, is unreasonable when the cost of such material exceeds the cost of foreign material by more than 20 percent plus the additional preference factor identified for the critical item or construction material containing critical components listed at FAR 25.105.

(2) For construction material that does not consist wholly or predominantly of iron or steel or a combination of both, if the cost of a particular domestic construction material is determined to be unreasonable or there is no domestic offer received, and the low offer is for foreign construction material that does not exceed 55 percent domestic content, the Contracting Officer will treat the lowest foreign offer of construction material that is manufactured in the United States and exceeds 55 percent domestic content as a domestic offer, and determine whether the cost of that offer is unreasonable by applying the evaluation factor listed in paragraph (b)(3)(i)(B)(1) of this clause.

(3) The procedures in paragraph (b)(3)(i)(B)(2) of this clause will no longer apply as of January 1, 2030.

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act. (1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(3) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American statute applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(3)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American statute applies, use of foreign construction material is noncompliant with the Buy American statute.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) *\
Item 1:			
Foreign construction material....	___	..... …….	___ .... ___ .....
Domestic construction material...	___	.....	___ .... ___ .....
Item 2:			
Foreign construction material....	___	..... …….	___ .... ___ .....
Domestic construction material...	___	.....	___ .... ___ .....

[* Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued)].
[List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]
[Include other applicable supporting information.]

(End of clause)

52.228-14 IRREVOCABLE LETTER OF CREDIT (NOV 2014)

(a) “Irrevocable letter of credit” (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to 40 U.S.C. chapter 31, subchapter III, Bonds, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d)(1) Only federally insured financial institutions rated investment grade by a commercial rating service shall issue or confirm the ILC.

(2) Unless the financial institution issuing the ILC had letter of credit business of at least $25 million in the past year, ILCs over $5 million must be confirmed by another acceptable financial institution that had letter of credit business of at least $25 million in the past year.

(3) The Offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institutions have the required credit rating as of the date of issuance of the ILC.

(4) The current rating for a financial institution is available through any of the following rating services registered with the U.S. Securities and Exchange Commission (SEC) as a Nationally Recognized Statistical Rating Organization (NRSRO). NRSRO's can be located at the Web site http://www.sec.gov/answers/nrsro.htm maintained by the SEC.

(e) The following format shall be used by the issuing financial institution to create an ILC:

___
[Issuing Financial Institution's Letterhead or Name and Address]

Issue Date _ ___

IRREVOCABLE LETTER OF CREDIT NO. ___

Account party's name ___ _

Account party's address ___ _

For Solicitation No. ___ _(for reference only)

TO: [___ U.S. Government agency]

[___ U.S. Government agency's address]

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States $ ___ . This Letter of Credit is payable at [issuing financial institution's and, if any, confirming financial institution's] office at [___ issuing financial institution's address and, if any, confirming financial institution's address] and expires with our close of business on ___ , or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution, for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically extended expiration date.

3. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, International Chamber of Commerce Publication No. ___ -- (Insert version in effect at the time of ILC issuance, e.g., ``Publication 600, 2006 edition'') and to the extent not inconsistent therewith, to the laws of ___ --[State of confirming financial institution, if any, otherwise State of issuing financial institution].

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

___

[___ Issuing financial institution]

(f) The following format shall be used by the financial institution to confirm an ILC:

___ [Confirming Financial Institution's Letterhead or Name and Address]

(Date) ___

Our Letter of Credit Advice Number ___

Beneficiary: ___ [U.S. Government agency]

Issuing Financial Institution: ___

Issuing Financial Institution's LC No.: ___

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by ___ [name of issuing financial institution] for drawings of up to United States dollars ___ _/U.S. $ ___ and expiring with our close of business on ___ [the expiration date], or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at ___ _.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this

Confirmation at our offices as specified herein.

4. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, International Chamber of Commerce Publication No. ____ -- (Insert version in effect at the time of ILC issuance, e.g., ``Publication 600, 2006 edition'') and to the extent not inconsistent therewith, to the laws of ____ --[State of confirming financial institution].

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17 of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

___

[Confirming financial institution]

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

___
[City, State]

(Date) ___

[Name and address of financial institution]

Pay to the order of ___ [Beneficiary Agency] ___ the sum of United States ___ This draft is drawn under Irrevocable Letter of Credit No. ___

___ [Beneficiary Agency]

By: ___

(End of clause)

52.232-39 UNENFORCEABILITY OF UNAUTHORIZED OBLIGATIONS (JUN 2013)

(a) Except as stated in paragraph (b) of this clause, when any supply or service acquired under this contract is subject to any End User License Agreement (EULA), Terms of Service (TOS), or similar

legal instrument or agreement, that includes any clause requiring the Government to indemnify the Contractor or any person or entity for damages, costs, fees, or any other loss or liability that would create an Anti-Deficiency Act violation (31 U.S.C. 1341), the following shall govern:

(1) Any such clause is unenforceable against the Government.

(2) Neither the Government nor any Government authorized end user shall be deemed to have agreed to such clause by virtue of it appearing in the EULA, TOS, or similar legal instrument or agreement. If the EULA, TOS, or similar legal instrument or agreement is invoked through an ``I agree'' click box or other comparable mechanism (e.g., ``click-wrap'' or ``browse-wrap'' agreements), execution does not bind the Government or any Government authorized end user to such clause.

(3) Any such clause is deemed to be stricken from the EULA, TOS, or similar legal instrument or agreement.

(b) Paragraph (a) of this clause does not apply to indemnification by the Government that is expressly authorized by statute and specifically authorized under applicable agency regulations and procedures.

(End of clause)

52.232-40 PROVIDING ACCELERATED PAYMENTS TO SMALL BUSINESS SUBCONTRACTORS (MAR 2023)

(a)(1) In accordance with 31 U.S.C. 3903 and 10 U.S.C. 3801, within 15 days after receipt of accelerated payments from the Government, the Contractor shall make accelerated payments to its small business subcontractors under this contract, to the maximum extent practicable and prior to when such payment is otherwise required under the applicable contract or subcontract, after receipt of a proper invoice and all other required documentation from the small business subcontractor.

(2) The Contractor agrees to make such payments to its small business subcontractors without any further consideration from or fees charged to the subcontractor.

(b) The acceleration of payments under this clause does not provide any new rights under the Prompt Payment Act.

(c) Include the substance of this clause, including this paragraph (c), in all subcontracts with small business concerns, including subcontracts with small business concerns for the acquisition of commercial products or commercial services.

(End of clause)

52.233-4 APPLICABLE LAW FOR BREACH OF CONTRACT CLAIM (OCT 2004)

United States law will apply to resolve any claim of breach of this contract.

(End of clause)

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least fifteen (15%) percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of clause)

52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

See Division 01 Specifications

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

https://www.acquisition.gov/browse/index/far

(End of clause)

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (NOV 2020)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any Defense Federal Acquisition Regulation (48 CFR Chapter 2) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of clause)

252.203-7004 DISPLAY OF HOTLINE POSTERS (JAN 2023)

(a) Definition. As used in this clause--

United States means the 50 States, the District of Columbia, and outlying areas.

(b) Display of hotline poster(s).

(1)(i) The Contractor shall display prominently the DoD fraud, waste, and abuse hotline poster prepared by the DoD Office of the Inspector General, in effect at time of contract award, in common work areas within business segments performing work under Department of Defense (DoD) contracts.

(ii) For contracts performed outside the United States, when security concerns can be appropriately demonstrated, the contracting officer may provide the contractor the option to publicize the program to contractor personnel in a manner other than public display of the poster, such as private employee written instructions and briefings.

(2) If the contract is funded, in whole or in part, by Department of Homeland Security (DHS) disaster relief funds and the work is to be performed in the United States, the DHS fraud hotline poster shall be displayed in addition to the DoD hotline poster. If a display of a DHS fraud hotline poster is required, the Contractor may obtain such poster from—

(i) DHS Office of Inspector General/MAIL STOP 0305, Attn: Office of Investigations – Hotline, 245 Murray Lane SW, Washington, DC 20528-0305; or

(ii) Via the internet at https://www.oig.dhs.gov/assets/Hotline/DHS_OIG_Hotline-optimized.jpg.

(c)(1) The DoD hotline poster may be obtained from: Defense Hotline, The Pentagon, Washington, D.C. 20301-1900, or is also available via the internet at https://www.dodig.mil/Resources/Posters-and-Brochures/.

(2) If a significant portion of the employee workforce does not speak English, then the poster is to be displayed in the foreign languages that a significant portion of the employees speak.

(3) Additionally, if the Contractor maintains a company website as a method of providing information to employees, the Contractor shall display an electronic version of the required poster at the website.

(d) Subcontracts. The Contractor shall include the substance of this clause, including this paragraph (d), in all subcontracts that exceed the threshold specified in Defense Federal Acquisition Regulation Supplement 203.1004(b)(2)(ii) on the date of subcontract award, except when the subcontract is for the acquisition of a commercial product or commercial service.

(End of clause)

252.204-7006 BILLING INSTRUCTIONS (OCT 2005)

When submitting a request for payment, the Contractor shall--

(a) Identify the contract line item(s) on the payment request that reasonably reflect contract work performance; and

(b) Separately identify a payment amount for each contract line item included in the payment request.

(End of clause)

252.204-7012 SAFEGUARDING COVERED DEFENSE INFORMATION AND CYBER INCIDENT REPORTING (JAN 2023)

(a) Definitions. As used in this clause--

Adequate security means protective measures that are commensurate with the consequences and probability of loss, misuse, or unauthorized access to, or modification of information.

Compromise means disclosure of information to unauthorized persons, or a violation of the security policy of a system, in which unauthorized intentional or unintentional disclosure, modification, destruction, or loss of an object, or the copying of information to unauthorized media may have occurred.

Contractor attributional/proprietary information means information that identifies the contractor(s), whether directly or indirectly, by the grouping of information that can be traced back to the contractor(s) (e.g., program description, facility locations), personally identifiable information, as well as trade secrets, commercial or financial information, or other commercially sensitive information that is not customarily shared outside of the company.

Controlled technical information means technical information with military or space application that is subject to controls on the access, use, reproduction, modification, performance, display, release, disclosure, or dissemination. Controlled technical information would meet the criteria, if disseminated, for distribution statements B through F using the criteria set forth in DoD Instruction 5230.24, Distribution Statements on Technical Documents. The term does not include information that is lawfully publicly available without restrictions.

Covered contractor information system means an unclassified information system that is owned, or operated by or for, a contractor and that processes, stores, or transmits covered defense information.

Covered defense information means unclassified controlled technical information or other information, as described in the Controlled Unclassified Information (CUI) Registry at http://www.archives.gov/cui/registry/category-list.html, that requires safeguarding or dissemination controls pursuant to and consistent with law, regulations, and Governmentwide policies, and is--

(1) Marked or otherwise identified in the contract, task order, or delivery order and provided to the contractor by or on behalf of DoD in support of the performance of the contract; or

(2) Collected, developed, received, transmitted, used, or stored by or on behalf of the contractor in support of the performance of the contract.

Cyber incident means actions taken through the use of computer networks that result in a compromise or an actual or potentially adverse effect on an information system and/or the information residing therein.

Forensic analysis means the practice of gathering, retaining, and analyzing computer-related data for investigative purposes in a manner that maintains the integrity of the data.

Information system means a discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information.

Malicious software means computer software or firmware intended to perform an unauthorized process that will have adverse impact on the confidentiality, integrity, or availability of an information system. This definition includes a virus, worm, Trojan horse, or other code-based entity that infects a host, as well as spyware and some forms of adware.

Media means physical devices or writing surfaces including, but is not limited to, magnetic tapes, optical disks, magnetic disks, large-scale integration memory chips, and printouts onto which covered defense information is recorded, stored, or printed within a covered contractor information system.

Operationally critical support means supplies or services designated by the Government as critical for airlift, sealift, intermodal transportation services, or logistical support that is essential to the mobilization, deployment, or sustainment of the Armed Forces in a contingency operation.

Rapidly report means within 72 hours of discovery of any cyber incident.

Technical information means technical data or computer software, as those terms are defined in the clause at DFARS 252.227-7013, Rights in Technical Data--Other Than Commercial Products and Commercial Services, regardless of whether or not the clause is incorporated in this solicitation or contract. Examples of technical information include research and engineering data, engineering drawings, and associated lists, specifications, standards, process sheets, manuals, technical reports, technical orders, catalog-item identifications, data sets, studies and analyses and related information, and computer software executable code and source code.

(b) Adequate security. The Contractor shall provide adequate security on all covered contractor information systems. To provide adequate security, the Contractor shall implement, at a minimum, the following information security protections:

(1) For covered contractor information systems that are part of an information technology (IT) service or system operated on behalf of the Government, the following security requirements apply:

(i) Cloud computing services shall be subject to the security requirements specified in the clause 252.239-7010, Cloud Computing Services, of this contract.

(ii) Any other such IT service or system (i.e., other than cloud computing) shall be subject to the security requirements specified elsewhere in this contract.

(2) For covered contractor information systems that are not part of an IT service or system operated on behalf of the Government and therefore are not subject to the security requirement specified at paragraph (b)(1) of this clause, the following security requirements apply:

(i) Except as provided in paragraph (b)(2)(ii) of this clause, the covered contractor information system shall be subject to the security requirements in National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" (available via the internet at http://dx.doi.org/10.6028/NIST.SP.800-171) in effect at the time the solicitation is issued or as authorized by the Contracting Officer.

(ii)(A) The Contractor shall implement NIST SP 800-171, as soon as practical, but not later than December 31, 2017. For all contracts awarded prior to October 1, 2017, the Contractor shall notify the DoD Chief Information Officer (CIO), via email at osd.dibcsia@mail.mil, within 30 days of contract award, of any security requirements specified by NIST SP 800-171 not implemented at the time of contract award.

(B) The Contractor shall submit requests to vary from NIST SP 800-171 in writing to the Contracting Officer, for consideration by the DoD CIO. The Contractor need not implement any security requirement adjudicated by an authorized representative of the DoD CIO to be nonapplicable or to have an alternative, but equally effective, security measure that may be implemented in its place.

(C) If the DoD CIO has previously adjudicated the contractor's requests indicating that a requirement is not applicable or that an alternative security measure is equally effective, a copy of that approval shall be provided to the Contracting Officer when requesting its recognition under this contract.

(D) If the Contractor intends to use an external cloud service provider to store, process, or transmit any covered defense information in performance of this contract, the Contractor shall require and ensure that the cloud service provider meets security requirements equivalent to those established by the Government for the Federal Risk and Authorization Management Program (FedRAMP) Moderate baseline (https://www.fedramp.gov/resources/documents/) and that the cloud service provider complies with requirements in paragraphs (c) through (g) of this clause for cyber incident reporting, malicious software, media preservation and protection, access to additional information and equipment necessary for forensic analysis, and cyber incident damage assessment.

(3) Apply other information systems security measures when the Contractor reasonably determines that information systems security measures, in addition to those identified in paragraphs (b)(1) and (2) of this clause, may be required to provide adequate security in a dynamic environment or to accommodate special circumstances (e.g., medical devices) and any individual, isolated, or temporary deficiencies based on an assessed risk or vulnerability. These measures may be addressed in a system security plan.

(c) Cyber incident reporting requirement.

(1) When the Contractor discovers a cyber incident that affects a covered contractor information system or the covered defense information residing therein, or that affects the contractor's ability to perform the requirements of the contract that are designated as operationally critical support and identified in the contract, the Contractor shall--

(i) Conduct a review for evidence of compromise of covered defense information, including, but not limited to, identifying compromised computers, servers, specific data, and user accounts. This review shall also include analyzing covered contractor information system(s) that were part of the cyber incident, as well as other information systems on the Contractor's network(s), that may have been accessed as a result of the incident in order to identify compromised covered defense information, or that affect the Contractor's ability to provide operationally critical support; and

(ii) Rapidly report cyber incidents to DoD at https://dibnet.dod.mil.

(2) Cyber incident report. The cyber incident report shall be treated as information created by or for DoD and shall include, at a minimum, the required elements at https://dibnet.dod.mil.

(3) Medium assurance certificate requirement. In order to report cyber incidents in accordance with this clause, the Contractor or subcontractor shall have or acquire a DoD-approved medium assurance certificate to report cyber incidents. For information on obtaining a DoD-approved medium assurance certificate, see https://public.cyber.mil/eca/.

(d) Malicious software. When the Contractor or subcontractors discover and isolate malicious software in connection with a reported cyber incident, submit the malicious software to DoD Cyber Crime Center (DC3) in accordance with instructions provided by DC3 or the Contracting Officer. Do not send the malicious software to the Contracting Officer.

(e) Media preservation and protection. When a Contractor discovers a cyber incident has occurred, the Contractor shall preserve and protect images of all known affected information systems identified in paragraph (c)(1)(i) of this clause and all relevant monitoring/packet capture data for at least 90 days from the submission of the cyber incident report to allow DoD to request the media or decline interest.

(f) Access to additional information or equipment necessary for forensic analysis. Upon request by DoD, the Contractor shall provide DoD with access to additional information or equipment that is necessary to conduct a forensic analysis.

(g) Cyber incident damage assessment activities. If DoD elects to conduct a damage assessment, the Contracting Officer will request that the Contractor provide all of the damage assessment information gathered in accordance with paragraph (e) of this clause.

(h) DoD safeguarding and use of contractor attributional/proprietary information. The Government shall protect against the unauthorized use or release of information obtained from the contractor (or derived from information obtained from the contractor) under this clause that includes contractor attributional/proprietary information, including such information submitted in accordance with paragraph (c). To the maximum extent practicable, the Contractor shall identify and mark attributional/proprietary information. In making an authorized release of such information, the Government will implement appropriate procedures to minimize the contractor attributional/proprietary information that is included in such authorized release, seeking to include only that information that is necessary for the authorized purpose(s) for which the information is being released.

(i) Use and release of contractor attributional/proprietary information not created by or for DoD. Information that is obtained from the contractor (or derived from information obtained from the contractor) under this clause that is not created by or for DoD is authorized to be released outside of DoD--

(1) To entities with missions that may be affected by such information;

(2) To entities that may be called upon to assist in the diagnosis, detection, or mitigation of cyber incidents;

(3) To Government entities that conduct counterintelligence or law enforcement investigations;

(4) For national security purposes, including cyber situational awareness and defense purposes (including with Defense Industrial Base (DIB) participants in the program at 32 CFR part 236); or

(5) To a support services contractor (“recipient”) that is directly supporting Government activities under a contract that includes the clause at 252.204-7009, Limitations on the Use or Disclosure of Third-Party Contractor Reported Cyber Incident Information.

(j) Use and release of contractor attributional/proprietary information created by or for DoD. Information that is obtained from the contractor (or derived from information obtained from the contractor) under this clause that is created by or for DoD (including the information submitted pursuant to paragraph (c) of this clause) is authorized to be used and released outside of DoD for purposes and activities authorized by paragraph (i) of this clause, and for any other lawful Government purpose or activity, subject to all applicable statutory, regulatory, and policy based restrictions on the Government's use and release of such information.

(k) The Contractor shall conduct activities under this clause in accordance with applicable laws and regulations on the interception, monitoring, access, use, and disclosure of electronic communications and data.

(l) Other safeguarding or reporting requirements. The safeguarding and cyber incident reporting required by this clause in no way abrogates the Contractor's responsibility for other safeguarding or cyber incident reporting pertaining to its unclassified information systems as required by other applicable clauses of this contract, or as a result of other applicable U.S. Government statutory or regulatory requirements.

(m) Subcontracts. The Contractor shall--

(1) Include this clause, including this paragraph (m), in subcontracts, or similar contractual instruments, for operationally critical support, or for which subcontract performance will involve covered defense information, including subcontracts for commercial products or commercial services, without alteration, except to identify the parties. The Contractor shall determine if the information required for subcontractor performance retains its identity as covered defense information and will require protection under this clause, and, if necessary, consult with the Contracting Officer; and

(2) Require subcontractors to--

(i) Notify the prime Contractor (or next higher-tier subcontractor) when submitting a request to vary from a NIST SP 800-171 security requirement to the Contracting Officer, in accordance with paragraph (b)(2)(ii)(B) of this clause; and

(ii) Provide the incident report number, automatically assigned by DoD, to the prime Contractor (or next higher-tier subcontractor) as soon as practicable, when reporting a cyber incident to DoD as required in paragraph (c) of this clause.

(End of clause)

252.204-7015 NOTICE OF AUTHORIZED DISCLOSURE OF INFORMATION FOR LITIGATION SUPPORT (JAN 2023)

(a) Definitions. As used in this clause--

Computer software means computer programs, source code, source code listings, object code listings, design details, algorithms, processes, flow charts, formulae, and related material that would enable the software to be reproduced, recreated, or recompiled. Computer software does not include computer data bases or computer software documentation.

Litigation support means administrative, technical, or professional services provided in support of the Government during or in anticipation of litigation.

Litigation support contractor means a contractor (including its experts, technical consultants, subcontractors, and suppliers) providing litigation support under a contract that contains the clause at 252.204-7014, Limitations on the Use or Disclosure of Information by Litigation Support Contractors.

Sensitive information means controlled unclassified information of a commercial, financial, proprietary, or privileged nature. The term includes technical data and computer software, but does not include information that is lawfully, publicly available without restriction.

Technical data means recorded information, regardless of the form or method of the recording, of a scientific or technical nature (including computer software documentation). The term does not include computer software or data incidental to contract administration, such as financial and/or management information.

(b) Notice of authorized disclosures. Notwithstanding any other provision of this solicitation or contract, the Government may disclose to a litigation support contractor, for the sole purpose of litigation support activities, any information, including sensitive information, received—

(1) Within or in connection with a quotation or offer; or

(2) In the performance of or in connection with a contract.

(c) Subcontracts. Include the substance of this clause, including this paragraph (c), in all subcontracts, including subcontracts for commercial products or commercial services.

(End of clause)

252.204-7018 PROHIBITION ON THE ACQUISITION OF COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES (JAN 2023)

(a) Definitions. As used in this clause--

Covered defense telecommunications equipment or services means--

(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation, or any subsidiary or affiliate of such entities;

(2) Telecommunications services provided by such entities or using such equipment; or

(3) Telecommunications equipment or services produced or provided by an entity that the Secretary of Defense reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Covered foreign country means--

(1) The People's Republic of China; or

(2) The Russian Federation.

Covered missions means--

(1) The nuclear deterrence mission of DoD, including with respect to nuclear command, control, and communications, integrated tactical warning and attack assessment, and continuity of Government; or

(2) The homeland defense mission of DoD, including with respect to ballistic missile defense.

Critical technology means--

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22, Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled--

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or

(6) Emerging and foundational technologies controlled pursuant to section 1758 of the Export Control Reform Act of 2018 (50 U.S.C. 4817).

Substantial or essential component means any component necessary for the proper function or performance of a piece of equipment, system, or service.

(b) Prohibition. In accordance with section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91), the contractor shall not provide to the Government any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless the covered defense telecommunication equipment or services are covered by a waiver described in Defense Federal Acquisition Regulation Supplement 204.2104.

(c) Procedures. The Contractor shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities that are excluded when providing any equipment, system, or service, to carry out covered missions, that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless a waiver is granted.

(d) Reporting.

(1) In the event the Contractor identifies covered defense telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, the Contractor shall report at https://dibnet.dod.mil the information in paragraph (d)(2) of this clause.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within 3 business days from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 30 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the Contractor shall describe the efforts it undertook to prevent use or submission of a covered defense telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial products or commercial services.

(End of clause)

252.204-7020 NIST SP 800-171 DOD ASSESSMENT REQUIREMENTS (JAN 2023)

(a) Definitions.

Basic Assessment means a contractor's self-assessment of the contractor's implementation of NIST SP 800-171 that-

(1) Is based on the Contractor's review of their system security plan(s) associated with covered contractor information system(s);

(2) Is conducted in accordance with the NIST SP 800-171 DoD Assessment Methodology; and

(3) Results in a confidence level of "Low" in the resulting score, because it is a self-generated score.

Covered contractor information system has the meaning given in the clause 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting, of this contract.

High Assessment means an assessment that is conducted by Government personnel using NIST SP 800-171A, Assessing Security Requirements for Controlled Unclassified Information that--

(1) Consists of--

(i) A review of a contractor's Basic Assessment;

(ii) A thorough document review;

(iii) Verification, examination, and demonstration of a Contractor's system security plan to validate that NIST SP 800-171 security requirements have been implemented as described in the contractor's system security plan; and

(iv) Discussions with the contractor to obtain additional information or clarification, as needed; and

(2) Results in a confidence level of "High" in the resulting score.

Medium Assessment means an assessment conducted by the Government that--

(1) Consists of--

(i) A review of a contractor's Basic Assessment;

(ii) A thorough document review; and

(iii) Discussions with the contractor to obtain additional information or clarification, as needed; and

(2) Results in a confidence level of "Medium" in the resulting score.

(b) Applicability. This clause applies to covered contractor information systems that are required to comply with the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, in accordance with Defense Federal Acquisition Regulation System (DFARS) clause at 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting, of this contract.

(c) Requirements. The Contractor shall provide access to its facilities, systems, and personnel necessary for the Government to conduct a Medium or High NIST SP 800-171 DoD Assessment, as described in NIST SP 800-171 DoD Assessment Methodology at https://www.acq.osd.mil/asda/dpc/cp/cyber/safeguarding.html#nistSP800171, if necessary.

(d) Procedures. Summary level scores for all assessments will be posted in the Supplier Performance Risk System (SPRS) (https://www.sprs.csd.disa.mil/) to provide DoD Components visibility into the summary level scores of strategic assessments.

(1) Basic Assessments. A contractor may submit, via encrypted email, summary level scores of Basic Assessments conducted in accordance with the NIST SP 800-171 DoD Assessment Methodology to webptsmh@navy.mil for posting to SPRS.

(i) The email shall include the following information:

(A) Version of NIST SP 800-171 against which the assessment was conducted.

(B) Organization conducting the assessment (e.g., Contractor self-assessment).

(C) For each system security plan (security requirement 3.12.4) supporting the performance of a DoD contract--

(1) All industry Commercial and Government Entity (CAGE) code(s) associated with the information system(s) addressed by the system security plan; and

(2) A brief description of the system security plan architecture, if more than one plan exists.

(D) Date the assessment was completed.

(E) Summary level score (e.g., 95 out of 110, NOT the individual value for each requirement).

(F) Date that all requirements are expected to be implemented (i.e., a score of 110 is expected to be achieved) based on information gathered from associated plan(s) of action developed in accordance with NIST SP 800-171.

(ii) If multiple system security plans are addressed in the email described at paragraph (b)(1)(i) of this section, the Contractor shall use the following format for the report:

System security plan	CAGE codes supported by this plan	Brief description of the plan architecture	Date of assessment	Total score	Date score of 110 will achieved

(2) Medium and High Assessments. DoD will post the following Medium and/or High Assessment summary level scores to SPRS for each system security plan assessed:

(i) The standard assessed (e.g., NIST SP 800-171 Rev 1).

(ii) Organization conducting the assessment, e.g., DCMA, or a specific organization (identified by Department of Defense Activity Address Code (DoDAAC)).

(iii) All industry CAGE code(s) associated with the information system(s) addressed by the system security plan.

(iv) A brief description of the system security plan architecture, if more than one system security plan exists.

(v) Date and level of the assessment, i.e., medium or high.

(vi) Summary level score (e.g., 105 out of 110, not the individual value assigned for each requirement).

(vii) Date that all requirements are expected to be implemented (i.e., a score of 110 is expected to be achieved) based on information gathered from associated plan(s) of action developed in accordance with NIST SP 800-171.

(e) Rebuttals. (1) DoD will provide Medium and High Assessment summary level scores to the Contractor and offer the opportunity for rebuttal and adjudication of assessment summary level scores prior to posting the summary level scores to SPRS (see SPRS User's Guide https://www.sprs.csd.disa.mil/pdf/SPRS_Awardee.pdf).

(2) Upon completion of each assessment, the contractor has 14 business days to provide additional information to demonstrate that they meet any security requirements not observed by the assessment team or to rebut the findings that may be of question.

(f) Accessibility.

(1) Assessment summary level scores posted in SPRS are available to DoD personnel, and are protected, in accordance with the standards set forth in DoD Instruction 5000.79, Defense-wide Sharing and Use of Supplier and Product Performance Information (PI).

(2) Authorized representatives of the Contractor for which the assessment was conducted may access SPRS to view their own summary level scores, in accordance with the SPRS Software User's Guide for Awardees/Contractors available at https://www.sprs.csd.disa.mil/pdf/SPRS_Awardee.pdf.

(3) A High NIST SP 800-171 DoD Assessment may result in documentation in addition to that listed in this clause. DoD will retain and protect any such documentation as "Controlled Unclassified Information (CUI)" and intended for internal DoD use only. The information will be protected against unauthorized use and release, including through the exercise of applicable exemptions under the Freedom of Information Act (e.g., Exemption 4 covers trade secrets and commercial or financial information obtained from a contractor that is privileged or confidential).

(g) Subcontracts.

(1) The Contractor shall insert the substance of this clause, including this paragraph (g), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial products or commercial services (excluding commercially available off-the-shelf items).

(2) The Contractor shall not award a subcontract or other contractual instrument, that is subject to the implementation of NIST SP 800-171 security requirements, in accordance with DFARS clause 252.204-7012 of this contract, unless the subcontractor has completed, within the last 3 years, at least a Basic NIST SP 800-171 DoD Assessment, as described in https://www.acq.osd.mil/asda/dpc/cp/cyber/safeguarding.html#nistSP800171, for all covered contractor information systems relevant to its offer that are not part of an information technology service or system operated on behalf of the Government.

(3) If a subcontractor does not have summary level scores of a current NIST SP 800-171 DoD Assessment (i.e., not more than 3 years old unless a lesser time is specified in the solicitation) posted in SPRS, the subcontractor may conduct and submit a Basic Assessment, in accordance with the NIST SP 800-171 DoD Assessment Methodology, to webptsmh@navy.mil for posting to SPRS along with the information required by paragraph (d) of this clause.

(End of clause)

252.225-7048 EXPORT-CONTROLLED ITEMS (JUNE 2013)

(a) Definition. ``Export-controlled items,'' as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR Parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130). The term includes--

(1) ``Defense items,'' defined in the Arms Export Control Act, 22 U.S.C. 2778(j)(4)(A), as defense articles, defense services, and related technical data, and further defined in the ITAR, 22 CFR Part 120; and

(2) ``Items,'' defined in the EAR as ``commodities'', ``software'', and ``technology,'' terms that are also defined in the EAR, 15 CFR 772.1.

(b) The Contractor shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to register with the Department of State in accordance with the ITAR. The Contractor shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

(c) The Contractor's responsibility to comply with all applicable laws and regulations regarding export-controlled items exists independent of, and is not established or limited by, the information provided by this clause.

(d) Nothing in the terms of this contract adds, changes, supersedes, or waives any of the requirements of applicable Federal laws, Executive orders, and regulations, including but not limited to—

(1) The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, et seq.);

(2) The Arms Export Control Act (22 U.S.C. 2751, et seq.);

(3) The International Emergency Economic Powers Act (50 U.S.C. 1701, et seq.);

(4) The Export Administration Regulations (15 CFR Parts 730-774);

(5) The International Traffic in Arms Regulations (22 CFR Parts 120-130); and

(6) Executive Order 13222, as extended.

(e) The Contractor shall include the substance of this clause, including this paragraph (e), in all subcontracts.

(End of clause)

252.225-7056 PROHIBITION REGARDING BUSINESS OPERATIONS WITH THE MADURO REGIME (JAN 2023)

(a) Definitions. As used in this clause--

Agency or instrumentality of the government of Venezuela means an agency or instrumentality of a foreign state as defined in 28 U.S.C. 1603(b), with each reference in section 1603(b) to a foreign state deemed to be a reference to Venezuela.

Business operations means engaging in commerce in any form, including acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.

Government of Venezuela means the government of any political subdivision of Venezuela, and any agency or instrumentality of the government of Venezuela.

Person means--

(1) A natural person, corporation, company, business association, partnership, society, trust, or any other nongovernmental entity, organization, or group;

(2) Any governmental entity or instrumentality of a government, including a multilateral development institution (as defined in section 1701(c)(3) of the International Financial Institutions Act (22 U.S.C. 262r(c)(3)); and

(3) Any successor, subunit, parent entity, or subsidiary of, or any entity under common ownership or control with, any entity described in paragraph (1) or (2) of this definition.

(b) Prohibition. In accordance with section 890 of the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116-92), DoD is prohibited from entering into a contract for the procurement of products or services with any person that has business operations with an authority of the government of Venezuela that is not recognized as the legitimate government of Venezuela by the U.S. Government, unless the person has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.

(c) The Contractor shall--

(1) Not have any business operations with an authority of the Maduro regime or the government of Venezuela that is not recognized as the legitimate government of Venezuela by the U.S. Government; or

(2) Have a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.

(d) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (d), in all subcontracts, including subcontracts for the acquisition of commercial products.

(End of clause)

252.225-7972 PROHIBITION ON THE PROCUREMENT OF FOREIGN-MADE UNMANNED AIRCRAFT SYSTEMS (MAY 2020) (DEVIATION 2020-O0015)

(a) Prohibition. In accordance with section 848 of the National Defense Authorization Act for Fiscal Year 2020, the Contractor shall not provide or use in the performance of this contract -

(1) An unmanned aircraft system (UAS), or any related services or equipment, that -

(i) Is manufactured in the People's Republic of China or by an entity domiciled in the People's Republic of China;

(ii) Uses flight controllers, radios, data transmission devices, cameras, or gimbals manufactured in the People's Republic of China or by an entity domiciled in the People's Republic of China;

(iii) Uses a ground control system or operating software developed in the People's Republic of China or by an entity domiciled in the People's Republic of China; or

(iv) Uses network connectivity or data storage located in, or administered by an entity domiciled in, the People's Republic of China; or

(2) A system for the detection or identification of a UAS, or any related services or equipment, that is manufactured-

(i) In the People's Republic of China; or

(ii) By an entity domiciled in the People's Republic of China.

(b) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (b), in all subcontracts or other contractual instruments, including subcontracts for the acquisition of commercial items.

(End of clause)

252.232-7017 ACCELERATING PAYMENTS TO SMALL BUSINESS SUBCONTRACTORS--PROHIBITION ON FEES AND CONSIDERATION (APR 2020)

(a) Definition. Accelerated payment, as used in this clause, means a payment made to a small business subcontractor as quickly as possible, with a goal of 15 days or less after receipt of payment from the Government or receipt of a proper invoice from the subcontractor, whichever is later.

(b) In accordance with section 852 of Public Law 115-232, the Contractor shall not require any further consideration from or charge fees to the small business subcontractor when making accelerated payments, as defined in paragraph (a) of this clause, to subcontractors under the clause at FAR 52.232-40, Providing Accelerated Payments to Small Business Subcontractors.

(c) Subcontracts. Include the substance of this clause, including this paragraph (c), in all subcontracts with small business concerns, including those for the acquisition of commercial items.

(End of clause)

252.236-7001 CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

See Drawing File Index

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in

FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

(End of clause)

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS
11/20, CHG 2: 05/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map

Progress and Completion Pictures

1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.4 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations. Provide monthly, and within one month of the completion of work, digital photographs, 1600x1200x24 bit true color minimum resolution in JPEG file format showing the sequence and progress of work. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten different viewpoints selected by the Contractor unless otherwise directed by the Contracting Officer. Submit with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Photographs provided are for unrestricted use by the Government.

1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 Liability, during the entire period of performance under this contract. Provide other insurance coverage as required by New Mexico law.

1.6 SUPERVISION

1.6.1 Superintendent Qualifications

Provide project superintendent with a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

1.6.2 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of Contract work.In addition, if a Quality Control (QC) representative is required on the Contract, then that individual must also have fluent English communication skills.

1.6.3 Duties

The project superintendent is primarily responsible for managing subcontractors and coordinating day-to-day production and schedule adherence on the project. The superintendent is required to attend partnering meetings, and quality control meetings. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

1.6.4 Non-Compliance Actions

The Project Superintendent is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to ensure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

1.7 PRECONSTRUCTION CONFERENCE

Immediately after award, prior to commencing any work at the site, coordinate with the Contracting Officer a time and place to meet for the Preconstruction Conference. The conference must take place within 35 calendar days after award of the contract, but prior to commencement of any work at the site. The purpose of this conference is to discuss and develop a mutual understanding of the administrative requirements of the Contract including but not limited to: daily reporting, invoicing, value

engineering, safety, base-access, outage requests, hot work permits, schedule requirements, quality control, schedule of prices or earned value report, shop drawings, submittals, cybersecurity, prosecution of the work, government acceptance, final inspections and contract close-out. Contractor must present and discuss their basic approach to scheduling the construction work and any required phasing.

1.7.1 Attendees

Contractor attendees must include the Project Manager, Superintendent, Site Safety and Health Officer (SSHO), Quality Control Manager and major subcontractors.

1.8 PARTNERING

Contractor shall host the partnering session within 45 calendar days of contract award. To most effectively accomplish this Contract, the Contractor and Government must form a cohesive partnership with the common goal of drawing on the strength of each organization in an effort to achieve a successful project without safety mishaps, conforming to the Contract, within budget and on schedule. The partnering team must consist of personnel from both the Government and Contractor including project level and corporate level leadership positions. Key Personnel from the supported command, end user, , Contractor, key subcontractors and the Designer of Record are required to participate in the Partnering process.

1.9 MOBILIZATION

Contractor shall mobilize to the jobsite within 60 calendar days after contract award. Mobilize is defined as having equipment AND having a physical presence of at least one person from the contractor's team on the jobsite.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES
08/18, CHG 4: 02/21

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Submittal Information

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

1.1.2 Project Type

The Contractor's Quality Control (CQC) System Manager is to check and approve all items before submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

1.1.3 Submission of Submittals

Schedule and provide submittals requiring Government approval before acquiring the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittal requirements are specified in the technical sections. Examples and descriptions of submittals identified by the Submittal Description (SD) numbers and titles follow:

SD-01 Preconstruction Submittals

Submittals that are required prior to or at the start of construction (work) or the next major phase of the construction on a multiphase contract.

Preconstruction Submittals include schedules and a tabular list of locations, features, and other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates Of Insurance

Surety Bonds

List Of Proposed Subcontractors

List Of Proposed Products

Baseline Network Analysis Schedule (NAS)

Submittal Register

Schedule Of Prices Or Earned Value Report

Accident Prevention Plan

Work Plan

Quality Control (QC) plan

Environmental Protection Plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those that will be removed at conclusion of the work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report that includes findings of a test required to be performed on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report that includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily logs and checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits

Text of posted operating instructions

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS)concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

Data provided by the manufacturer, or the system provider, including manufacturer's help and product line documentation, necessary to maintain and install equipment, for operating and maintenance use by facility personnel.

Data required by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

Data incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve the submittal.

1.2.3 Work

As used in this section, on-site and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction. In exception, excludes work to produce SD-01 submittals.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or “S” classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

1.4.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, variations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Government.

Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, submittals are considered to be "shop drawings."

1.4.2 For Information Only

Submittals not requiring Government approval will be for information only. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are not considered to be "shop drawings."

1.5 PREPARATION

1.5.1 Transmittal Form

Use the ENG Form 4025-R transmittal form for submitting both Government-approved and information-only submittals. Submit in accordance with the instructions on the reverse side of the form. These forms or similar forms are included in the RMS CM software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.5.2 Submittal Format

1.5.2.1 Format of SD-01 Preconstruction Submittals

When the submittal includes a document that is to be used in the project, or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.2.2 Format for SD-02 Shop Drawings

Provide shop drawings not less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full-size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless another form is required. Ensure drawings are suitable for reproduction and of a quality to produce clear, distinct lines and letters, with dark lines on a white background.

a. Include the nameplate data, size, and capacity on drawings. Also include applicable federal, military, industry, and technical society publication references.

b. Dimension drawings, except diagrams and schematic drawings. Prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Present shop drawings sized 8 1/2 by 11 inches as part of the bound volume for submittals. Present larger drawings in sets. Submit an electronic copy of drawings in PDF format.

1.5.2.2.1 Drawing Identification

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Each drawing is to bear the number of the submittal in a uniform location next to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Reserve a blank space on the right-hand side of each sheet for the Government disposition stamp.

1.5.2.3 Format of SD-03 Product Data

Present product data submittals for each section as a complete, bound volume. Include a table of contents, listing the page and catalog item numbers for product data.

Indicate, by prominent notation, each product that is being submitted; indicate the specification section number and paragraph number to which it pertains.

1.5.2.3.1 Product Information

Supplement product data with material prepared for the project to satisfy the submittal requirements where product data does not exist. Identify this material as developed specifically for the project, with information and format as required for submission of SD-07 Certificates.

Provide product data in units used in the Contract documents. Where product data are included in preprinted catalogs with another unit, submit the dimensions in contract document units, on a separate sheet.

1.5.2.3.2 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.2.3.3 Data Submission

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal that is marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of the construction effort.

Submit the manufacturer's instructions before installation.

1.5.2.4 Format of SD-04 Samples

1.5.2.4.1 Sample Characteristics

Furnish samples in the following sizes, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11

inches.

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample Volume of Nonsolid Materials: Pint. Examples of nonsolid materials are sand and paint.

f. Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

1.5.2.4.2 Sample Incorporation

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at the time of use.

Recording of Sample Installation: Note and preserve the notation of any area constituting a sample installation, but remove the notation at the final clean-up of the project.

1.5.2.4.3 Comparison Sample

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.5.2.5 Format of SD-05 Design Data

Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.5.2.6 Format of SD-06 Test Reports

Provide reports on 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.2.7 Format of SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.5.2.8 Format of SD-08 Manufacturer's Instructions

Present manufacturer's instructions submittals for each section as a complete, bound volume. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry, and technical-society publication references. If supplemental information is needed to clarify the manufacturer's data, submit it as specified for SD-07 Certificates.

Submit the manufacturer's instructions before installation.

1.5.2.8.1 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.2.9 Format of SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.2.10 Format of SD-11 Closeout Submittals

When the submittal includes a document that is to be used in the project or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.3 Source Drawings for Shop Drawings

1.5.3.1 Source Drawings

The entire set of source drawing files (DWG) will not be provided to the Contractor. Request the specific Drawing Number for the preparation of shop drawings. Only those drawings requested to prepare shop drawings will be provided. These drawings are provided only after award.

1.5.3.2 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim, and waives to the fullest extent permitted by law any claim or cause of action of any nature against the Government, its agents, or its subconsultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities, or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic source drawing files are not construction documents. Differences may exist between the source drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic source drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. The Contractor is responsible for determining if any conflict exists. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished source drawing files, the signed and sealed construction documents govern. Use of these source drawing files does not relieve the Contractor of the duty to fully comply with the contract documents, including and without limitation the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indication of ownership (seals, logos, signatures, initials and dates).

1.5.4 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, and coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is searchable and can be copied. If documents are scanned, optical character resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature or a scan of a signature.

E-mail electronic submittal documents smaller than 10MB to an e-mail address as directed by the Contracting Officer. Provide electronic documents over 10 MB on an optical disc or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: https://safe.amrdec.army.mil/safe/.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of SD-01 Preconstruction Submittal Copies

Unless otherwise specified, submit two sets of administrative submittals.

1.6.2 Number of SD-02 Shop Drawing Copies

Submit six copies of submittals of shop drawings requiring review and approval by a QC organization. Submit seven copies of shop drawings requiring review and approval by the Contracting Officer.

1.6.3 Number of SD-03 Product Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.4 Number of SD-04 Samples

a. Submit two samples, or two sets of samples showing the range of variation, of each required item. One approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in the technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of nonsolid materials.

1.6.5 Number of SD-05 Design Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.6 Number of SD-06 Test Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings, other than field test results that will be submitted with QC reports.

1.6.7 Number of SD-07 Certificate Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.8 Number of SD-08 Manufacturer's Instructions Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.9 Number of SD-09 Manufacturer's Field Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.10 Number of SD-10 Operation and Maintenance Data Copies

Submit five copies of O&M data to the Contracting Officer for review and approval.

1.6.11 Number of SD-11 Closeout Submittals Copies

Unless otherwise specified, submit two sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Submittals without a "G" designation must be certified by the QC manager and submitted to the Contracting Officer for information-only. Provide information-only submittals to the Contracting Officer a minimum of 14 calendar days prior to the Preparatory Meeting for the associated Definable Feature of Work (DFOW). Approval of the Contracting Officer is not required on information only submittals. The Contracting Officer will mark "receipt acknowledged" on submittals for information and will return only the transmittal cover sheet to the Contractor. Normally, submittals for information only will not be returned. However, the Government reserves the right to return unsatisfactory submittals and require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.8 PROJECT SUBMITTAL REGISTER

A sample Project Submittal Register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register."

1.8.1 Submittal Management

Prepare and maintain a submittal register, as the work progresses. Do not change data that is output in columns (c), (d), (e), and (f) as delivered by Government; retain data that is output in columns (a), (g), (h), and (i) as approved. As an attachment, provide a submittal register showing items of equipment and materials for which submittals are required by the specifications. This list may not be all-inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE(RMS CM). The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD Number. and type, e.g., SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in each specification

section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting the project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns and all dates on which submittals are received by and returned by the Government.

1.8.2 Preconstruction Use of Submittal Register

Submit the submittal register. Include the QC plan and the project schedule. Verify that all submittals required for the project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for the approving authority to receive submittals.

Column (h) Contractor Approval Date: Date that Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.3 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in the program used by the Contractor with each submittal throughout the contract.

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) Date submittal transmitted.

Column (q) Date approval was received.

1.8.4 Approving Authority Use of Submittal Register

Update the following fields:

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (l) Date submittal was received.

Column (m) through (p) Dates of review actions.

Column (q) Date of return to Contractor.

1.8.5 Action Codes

1.8.5.1 Contractor Action Codes

DESIGN BID BUILD SUBMITTALS			
Submittal Classifications shown in UFGS Sections	Submittal Classification	Corresponding SpecsIntact Submittal Register Code which is populated in the SI Submittal Register. Software Limitations: (The software shows one character delineation in the SpecsIntact Submittal Register)	RMS – The following Submittal Classifications are populated in RMS when the SpecsIntact Submittal Data File is pulled into RMS)
G	Submittal requires Government Approval	G	GA
BLANK	Submittal is For Information Only (FIO)	BLANK	FIO
S	Submittal is for documentation of Sustainable requirements	S	S/FIO

1.8.6 Delivery of Copies

Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request. Provide an updated Submittal Register monthly regardless of whether an invoice is submitted.

1.9 VARIATIONS

Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.9.1 Considering Variations

Discussion of variations with the Contracting Officer before submission will help ensure that functional and quality requirements are met and minimize rejections and resubmittals. For variations that include design changes or some material or product substitutions, the Government may require an evaluation and analysis by a licensed professional engineer hired by the contractor.

Specifically point out variations from contract requirements in a transmittal letter. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.9.2 Proposing Variations

Specifically point out variations from contract requirements in a transmittal letter. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

Check the column "variation" of ENG Form 4025 for submittals that include variations proposed by the Contractor. Set forth in writing the reason for any variations and note such variations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted variations.

1.9.3 Warranting that Variations are Compatible

When delivering a variation for approval, the Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.9.4 Review Schedule Extension

In addition to the normal submittal review period, a period of 14 calendar days will be allowed for the Government to consider submittals with variations.

1.10 SCHEDULING

Schedule and submit concurrently product data and shop drawings covering component items forming a system or items that are interrelated. Submit pertinent certifications at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. Allow an additional 15 calendar days for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. The Contractor is responsible for additional time required for Government reviews resulting from required resubmittals. The review period for each resubmittal is the same as for the initial submittal.

b. Submittals required by the contract documents are listed on the submittal register. If a submittal is listed in the submittal register but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but that have been omitted from the register or marked "N/A."

c. Resubmit the submittal register and annotate it monthly with actual submission and approval dates. When all items on the register have been fully approved, no further resubmittal is required.

Contracting Officer review will be completed within 30 calendar days after the date of submission.

1.11 GOVERNMENT APPROVING AUTHORITY

When the approving authority is the Contracting Officer, the Government will:

a. Note the date on which the submittal was received.

b. Review submittals for approval within the scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with comments and markings appropriate for the action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. Three copies of the submittal will be retained by the Contracting Officer and 1 copy of the submittal will be returned to the Contractor.

1.11.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize proceeding with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize proceeding with the work covered provided that the Contractor takes no exception to the corrections.

c. Submittals marked "not approved," "disapproved," or "revise and resubmit" indicate incomplete submittal or noncompliance with the contract requirements or design concept. Resubmit with appropriate changes. Do not proceed with work for this item until the resubmittal is approved.

d. Submittals marked "not reviewed" indicate that the submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

e. Submittals marked "receipt acknowledged" indicate that submittals have been received by the Government. This applies only to "information-only submittals" as previously defined.

1.12 DISAPPROVED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications, give notice to the Contracting Officer as required under the FAR clause titled CHANGES. The Contractor is responsible for the dimensions and design of connection details and the construction of work. Failure to point out variations may cause the Government to require rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and resubmit in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals is not to be construed as a complete check, and indicates only that

Approval or acceptance by the Government for a submittal does not relieve the Contractor of the responsibility for meeting the contract requirements or for any error that may exist, because under the Quality Control (QC) requirements of this contract, the Contractor is responsible for ensuring information contained with in each submittal accurately conforms with the requirements of the contract documents.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, provide assurance that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those that may be damaged in testing, will be returned to the Contractor, at its expense, upon completion of the contract. Unapproved samples will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make as that material. The Government reserves the right to disapprove any material or equipment that has previously proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Replace such materials or equipment to meet contract requirements.

1.15 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.16 CERTIFICATION OF SUBMITTAL DATA

Certify the submittal data as follows on Form ENG 4025: "I certify that the above submitted items had been reviewed in detail and are correct and

in strict conformance with the contract drawings and specifications except as otherwise stated.

_____NAME OF CONTRACTOR _____ SIGNATURE OF CONTRACTOR

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
VA NM Repair-Replace Elevators in B-41

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)		(q)	(r)
		01 30 00	SD-01 Preconstruction Submittals																
			View Location Map	1.3															
			Progress and Completion Pictures	1.4															
		01 33 00	SD-01 Preconstruction Submittals																
			Submittal Register	1.8	G														
		01 35 26	SD-01 Preconstruction Submittals																
			Accident Prevention Plan (APP)	1.7	G														
			SD-06 Test Reports																
			Monthly Exposure Reports	1.4															
			Notifications and Reports	1.12															
			Accident Reports	1.12.2	G														
			LHE Inspection Reports	1.12.3															
			SD-07 Certificates																
			Crane Operators/Riggers	1.6.1.4															
			Standard Lift Plan	1.7.3.3	G														
			Critical Lift Plan	1.7.3.4	G														
			Activity Hazard Analysis (AHA)	1.8															
			Confined Space Entry Permit	1.9.1															
			Hot Work Permit	1.9.1															
			Certificate of Compliance	1.12.4															
			License Certificates																
			Portable Gauge Operations		G														
			Planning Worksheet																
		01 45 00.00 10	SD-01 Preconstruction Submittals																

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 45 00.00 10	Contractor Quality Control (CQC) Plan	3.2	G													
			SD-06 Test Reports															
			Verification Statement	3.9.2														
		01 50 00	SD-01 Preconstruction Submittals															
			Construction Site Plan	1.3	G													
			Traffic Control Plan	3.4.1	G													
			Haul Road Plan	2.2.1	G													
			Contractor Computer Cybersecurity Compliance Statements	1.6.1.4	G													
			Contractor Temporary Network Cybersecurity Compliance Statements	1.6.6	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	3.5														
			SD-07 Certificates															
			Backflow Tester	1.4.1														
			Backflow Preventers	1.4														
		01 57 19	SD-01 Preconstruction Submittals															
			Preconstruction Survey	1.5.1														
			Solid Waste Management Permit	1.9	G													
			Regulatory Notifications	1.5.2	G													
			Environmental Protection Plan	1.6	G	ECGE												
			Stormwater Pollution Prevention Plan	3.3.1.1	G	ECGE												

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)		(q)	(r)
		01 57 19	Stormwater Notice of Intent	3.3.1.2	G	ECGE													
			Dirt and Dust Control Plan	1.6.9.1	G	ECGE													
			Employee Training Records	1.5.5	G	ECGE													
			Environmental Manager	1.5.4	G	ECGE													
			Qualifications																
			SD-06 Test Reports																
			Laboratory Analysis		G	ECGE													
			Inspection Reports	3.3.1.3															
			Monthly Solid Waste Disposal	1.9.1	G														
			Report																
			SD-07 Certificates																
			Employee Training Records	1.5.5	G														
			Certificate of Competency																
			Erosion and Sediment Control	1.5.5															
			Inspector																
			SD-11 Closeout Submittals																
			Stormwater Pollution Prevention	3.3.1.4	G														
			Plan Compliance Notebook																
			Stormwater Notice of Termination	3.3.1.5	G														
			Waste Determination	3.8.1	G														
			Documentation																
			Disposal Documentation for	3.8.3.6	G														
			Hazardous and Regulated Waste																
			Assembled Employee Training	1.5.5	G														
			Records																
			Solid Waste Management Permit	1.9	G														

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)		(q)	(r)
		01 57 19	Project Solid Waste Disposal	3.8.2.1	G														
			Documentation Report																
			Contractor Hazardous Material	3.9.1	G														
			Inventory Log																
			Hazardous Waste/Debris	3.8.3.1	G ECGE														
			Management																
			Regulatory Notifications	1.5.2	G														
			Sales Documentation	3.8.2.1	G														
			Contractor Certification	3.8.2.1															
			As-Built Topographic Survey	3.3.1.5															
		01 58 00	SD-02 Shop Drawings																
			Preliminary One Line	1.3.1.1	G														
			Sign Legend Orders	1.4.1	G														
			SD-04 Samples																
			Final Rendering	1.3.1.2	G														
			Final Framed Rendering	1.3.1.3	G														
		01 74 19	SD-01 Preconstruction Submittals																
			Construction Waste Management	1.7	G ECGE														
			Plan																
			SD-06 Test Reports																
			Quarterly Reports	1.9.2															
			Annual Report	1.9.3															
			SD-11 Closeout Submittals																
			Final Construction Waste	1.10	S														
			Diversion Report																
		01 78 00	SD-03 Product Data																

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		01 78 00	Warranty Management Plan	1.8.1														
			Warranty Tags	1.8.5														
			Spare Parts Data	1.6														
			SD-08 Manufacturer's Instructions															
			Instructions	1.8.1														
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.7	G													
			Manuals															
			SD-11 Closeout Submittals															
			As-Built Drawings	3.1	G													
			Record Drawings	3.3	G													
			Record Model	2.2	G													
			As-Built Record of Equipment	1.8.1														
			and Materials															
			As-Built Record of Equipment	3.6														
			and Materials															
			Final Approved Shop Drawings	3.4	G													
			Construction Contract	3.5	G													
			Specifications															
			Certification of EPA Designated	2.3	G													
			Items															
			Certification Of USDA Designated	2.4	G													
			Items															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
VA NM Repair-Replace Elevators in B-41

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG # RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)		(q)	(r)
		01 78 00	High Performance and		G														
			Sustainable Building (HPSB)																
			Checklist																
		02 82 00	SD-03 Product Data																
			Amended Water	1.2.2	G														
			Safety Data Sheets (SDS) for All	1.3.9	G														
			Materials																
			Encapsulants	2.1	G														
			Respirators	3.1.2.1	G														
			Local Exhaust Equipment	3.1.7	G														
			Pressure Differential Automatic	3.1.7	G														
			Recording Instrument																
			Vacuums	3.1.8	G														
			SD-06 Test Reports																
			Air Sampling Results	1.5.5	G														
			Pressure Differential Recordings	1.5.6	G														
			for Local Exhaust System																
			Clearance Sampling	3.2.13.5	G														
			Asbestos Disposal Quantity	3.3.3.2	G														
			Report																
			SD-07 Certificates																
			Employee Training	1.3.4	G														
			Notifications	1.3.5	G														
			Respiratory Protection Program	1.3.7	G														
			Asbestos Hazard Abatement Plan	1.3.10	G														
			Testing Laboratory	1.3.11	G														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
VA NM Repair-Replace Elevators in B-41

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		02 82 00	Landfill Approval	1.3.12	G														
			Delivery Tickets	1.3.12	G														
			Waste Shipment Records	1.3.12	G														
			Transporter Certification	1.3.13	G														
			Medical Certification	1.3.14	G														
			Private Qualified Person	1.5.1	G														
			Documentation																
			Competent Person	1.5.2	G														
			Worker's License	1.5.3	G														
			Contractor's License	1.5.4	G														
			Federal, State or Local Citations	1.5.7	G														
			on Previous Projects																
			Encapsulants	2.1	G														
			Equipment Used to Contain	3.1	G														
			Airborne Asbestos Fibers																
			Water Filtration Equipment	3.1.3.3	G														
			Vacuums	3.1.8	G														
			Ventilation Systems	3.1.8	G														
			SD-11 Closeout Submittals																
			Permits and Licenses	1.3.5	G														
			Notifications	1.3.5	G														
			Respirator Program Records	1.3.7.1	G														
			Rental Equipment	1.7.1	G														
		02 83 00	SD-01 Preconstruction Submittals																
			Competent Person	1.5.1.1	G														
			Training Certification	1.5.1.2	G														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
VA NM Repair-Replace Elevators in B-41

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		02 83 00	Medical Examinations	1.5.2.4	G												
			Lead, Cadmium, Chromium	1.5.2.8	G												
			Waste Management Plan														
			Occupant Protection Plan	1.5.4	G												
			Lead, Cadmium, Chromium	1.5.2.2	G												
			Compliance Plan														
			Lead, Cadmium, Chromium	3.1.1.6	G												
			Compliance Plan														
			Written Evidence of TSD	3.5.2.1	G												
			Approval														
			SD-03 Product Data														
			Respirators	1.6.1	G												
			Vacuum Filters	1.6.4	G												
			Negative Air Pressure System	1.6.7	G												
			Materials and Equipment	2.1	G												
			Expendable Supplies	2.1.1	G												
			Local Exhaust Equipment	3.1.1.5	G												
			Pressure Differential Automatic	3.1.1.5	G												
			Recording Instrument														
			Pressure Differential Log	3.1.1.6	G												
			SD-06 Test Reports														
			Sampling and Analysis	1.3.3	G												
			Environmental Assessment Data	1.5.2.3	G												
			Report														
			Sampling Results	1.5.2.3	G												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
VA NM Repair-Replace Elevators in B-41

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		02 83 00	Pressure Differential Recordings	1.5.3	G														
			For Local Exhaust System																
			SD-07 Certificates																
			Testing Laboratory	1.5.1.3	G														
			SD-11 Closeout Submittals																
			Hazardous Waste Manifest	3.5.2.1	G														
			Turn-In Documents or Weight	3.5.2.1	G														
			Tickets																

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS
11/20, CHG 2: 11/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.3	(2020) Tower Cranes
ASME B30.5	(2018) Mobile and Locomotive Cranes
ASME B30.7	(2016) Winches
ASME B30.9	(2018) Slings
ASME B30.20	(2018) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.23	(2016) Personnel Lifting Systems Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ASME B30.26	(2015; R 2020) Rigging Hardware

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.22	(2007; R 2017) Safety Requirements for Rope-Guided and Non-Guided Workers' Hoists
ASSP A10.34	(2021) Protection of the Public on or Adjacent to Construction Sites
ASSP A10.44	(2020) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSP Z244.1	(2016) The Control of Hazardous Energy Lockout, Tagout and Alternative Methods
ASSP Z359.0	(2018) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSP Z359.1	(2020) The Fall Protection Code
ASSP Z359.2	(2017) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSP Z359.3	(2019) Safety Requirements for Lanyards

and Positioning Lanyards

ASSP Z359.4 (2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components

ASSP Z359.6 (2016) Specifications and Design Requirements for Active Fall Protection Systems

ASSP Z359.7 (2019) Qualification and Verification Testing of Fall Protection Products

ASSP Z359.11 (2014) Safety Requirements for Full Body Harnesses

ASSP Z359.12 (2019) Connecting Components for Personal Fall Arrest Systems

ASSP Z359.13 (2013) Personal Energy Absorbers and Energy Absorbing Lanyards

ASSP Z359.14 (2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems

ASSP Z359.15 (2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems

ASSP Z359.16 (2016) Safety Requirements for Climbing Ladder Fall Arrest Systems

ASSP Z359.18 (2017) Safety Requirements for Anchorage Connectors for Active Fall Protection Systems

ASTM INTERNATIONAL (ASTM)

ASTM F855 (2019) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048 (2016) Guide for Protective Grounding of Power Lines

IEEE C2 (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2022; ERTA 1 2021) Standard for Portable Fire Extinguishers

NFPA 51B (2019; TIA 20-1) Standard for Fire Prevention During Welding, Cutting, and

	Other Hot Work
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 241	(2022) Standard for Safeguarding Construction, Alteration, and Demolition Operations

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222	(2018H; Add 1 2019) Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures
TIA-1019	(2012; R 2016) Standard for Installation, Alteration and Maintenance of Antenna Supporting Structures and Antennas

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety - Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1910.333	Selection and Use of Work Practices
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.450	Scaffolds
29 CFR 1926.500	Fall Protection
29 CFR 1926.552	Material Hoists, Personal Hoists, and Elevators
29 CFR 1926.553	Base-Mounted Drum Hoists
29 CFR 1926.1400	Cranes and Derricks in Construction
CPL 02-01-056	(2014) Inspection Procedures for Accessing Communication Towers by Hoist

CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSP Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented including experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the training material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even when provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have

occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the definition requirements of EM 385-1-1 Appendix Q, and ASSP Z359.2 standard, having a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

a. Death, regardless of the time between the injury and death, or the length of the illness;

b. Days away from work (any time lost after day of injury/illness onset);

c. Restricted work;

d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above

1.2.17 Government Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.18 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the

operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap using the Crane High Hazard working group mishap reporting form.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan; G

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

License Certificates

Portable Gauge Operations Planning Worksheet; G

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing

request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this Contract, comply with the most recent edition of USACE EM 385-1-1, and the following federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and Government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.6.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may not serve as the Quality Control Manager. The SSHO may not serve as the Superintendent.

1.6.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their

professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the Contracting Officer for information in consultation with the Safety Office.

1.6.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1, Section 34.

1.6.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.6.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04, 21.B.03, and herein.

1.6.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards, Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.6.1.4 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane

operators (i.e., union, a Government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

1.6.2 Personnel Duties

1.6.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above or any other required duties are not being effectively carried out. If either the Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health Officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the Contract. This list of proposed AHAs will be reviewed and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

1.6.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors at the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.7 ACCIDENT PREVENTION PLAN (APP)

1.7.1 APP - Construction

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of

the Contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the Contract. Disregarding the provisions of this Contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the Contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSP A10.34), and the environment.

1.7.2 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.7.3 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.7.3.1 COVID-19 Monitoring Plan

Include a site specific COVID-19 monitoring plan which addresses at a minimum the following elements:

a. Procedures for periodic sanitation inspections.

b. Procedures for disinfecting project site to include high traffic areas in accordance with Center for Disease Control (CDC) guidelines.

c. Site specific measures to practice social distancing while working on the project, where practicable.

d. Employee training on the signs, symptoms, and protection measures in accordance with CDC guidelines.

e. Follow current published best practices by CDC, World Health Organization, and OSHA:

(1) www.coronavirus.gov

(2) www.cdc.gov/coronavirus

(3) https://www.osha.gov/SLTC/covid-19/

f. Where more stringent federal, state, and local government COVID recommendations exist, the most stringent practice may apply.

1.7.3.2 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this Contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.7.3.3 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of three months.

1.7.3.4 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

a. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.

b. For lifts with anticipated binding conditions.

c. When erecting cranes.

1.7.3.4.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

1.7.3.4.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

1.7.3.5 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.7.3.6 Fall Protection and Prevention (FP&P) Plan

The plan must be in accordance with the requirements of EM 385-1-1, Section 21.D and ASSP Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.7.3.7 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSP Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical

assistance; and transportation routes to a medical facility.

1.7.3.8 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, ASSP Z244.1, and ASSP A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.7.3.9 Excavation Plan

Identify the safety and health aspects of excavation and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A; Federal, State and Local codes; and applicable regulations.

1.7.3.10 Lead, Cadmium, and Chromium Compliance Plan

Identify the safety and health aspects of work involving lead, cadmium and chromium, and prepare in accordance with Section 02 83 00 LEAD REMEDIATION.

1.7.3.11 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work, and prepare in accordance with Section 02 82 00 ASBESTOS REMEDIATION.

1.7.3.12 Site Demolition Plan

Identify the safety and health aspects and prepare in accordance with applicable Federal, State, and Local codes; applicable regulations; and referenced sources. Include engineering survey as applicable.

1.8 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.8.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.8.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.9 DISPLAY OF SAFETY INFORMATION

1.9.1 Safety Bulletin Board

Prior to commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.9.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.10 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.11 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. Government has no responsibility to provide emergency medical treatment.

1.12 NOTIFICATIONS and REPORTS

1.12.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than four hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; Contract title; type of Contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.12.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable USACE Accident Report Form 3394, and provide the report to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: For Army projects, report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

1.12.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.12.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this Contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.13 HOT WORK

1.13.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Department. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Department phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DEPARTMENT IMMEDIATELY.

1.13.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist, or Certified Industrial Hygienist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.14 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive

CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used.

1.14.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.14.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.14.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.14.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must comply with the applicable Storm Plan and:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated

noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. Develop an employee check-in/check-out communication procedure to ensure employee safety.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this Contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4 Changes and FAR 52.236-2 Differing Site Conditions.

3.2 UTILITY OUTAGE REQUIREMENTS

Apply for utility outages at least 14 days in advance. At a minimum, the written request must include the location of the outage, utilities being affected, duration of outage, any necessary sketches, and a description of

the means to fulfill energy isolation requirements in accordance with EM 385-1-1, Section 11.A.02 (Isolation). Some examples of energy isolation devices and procedures are highlighted in EM 385-1-1, Section 12.D. In accordance with EM 385-1-1, Section 12.A.01, where outages involve Government or Utility personnel, coordinate with the Government on all activities involving the control of hazardous energy.

These activities include, but are not limited to, a review of HECP and HEC procedures, as well as applicable Activity Hazard Analyses (AHAs). In accordance with EM 385-1-1, Section 11.A.02 and NFPA 70E, work on energized electrical circuits must not be performed without prior Government authorization. Government permission is considered through the permit process and submission of a detailed AHA. Energized work permits are considered only when de-energizing introduces additional or increased hazard or when de-energizing is infeasible.

3.3 OUTAGE COORDINATION MEETING

After the utility outage request is approved and prior to beginning work on the utility system requiring shut-down, conduct a pre-outage coordination meeting in accordance with EM 385-1-1, Section 12.A. This meeting must include the Prime Contractor, the Prime and subcontractors performing the work, the Contracting Officer, and the Installation representative. All parties must fully coordinate HEC activities with one another. During the coordination meeting, all parties must discuss and coordinate on the scope of work, HEC procedures (specifically, the lock-out/tag-out procedures for worker and utility protection), the AHA, assurance of trade personnel qualifications, identification of competent persons, and compliance with HECP training in accordance with EM 385-1-1, Section 12.C. Clarify when personal protective equipment is required during switching operations, inspection, and verification.

3.4 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, ASSP A10.44, NFPA 70E, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4.1 Safety Preparatory Inspection Coordination Meeting with the Government or Utility

For electrical distribution equipment that is to be operated by Government or Utility personnel, the Prime Contractor and the subcontractor performing the work must attend the safety preparatory inspection coordination meeting, which will also be attended by the Contracting Officer's Representative, and required by EM 385-1-1, Section 12.A.02. The meeting will occur immediately preceding the start of work and following the completion of the outage coordination meeting. Both the safety preparatory inspection coordination meeting and the outage coordination meeting must occur prior to conducting the outage and commencing with lockout/tagout procedures.

3.4.2 Lockout/Tagout Isolation

Where the Government or Utility performs equipment isolation and lockout/tagout, the Contractor must place their own locks and tags on each energy-isolating device and proceed in accordance with the HECP. Before any work begins, both the Contractor and the Government or Utility must perform energy isolation verification testing while wearing required PPE

detailed in the Contractor's AHA and required by EM 385-1-1, Sections 05.I and 11.B. Install personal protective grounds, with tags, to eliminate the potential for induced voltage in accordance with EM 385-1-1, Section 12.E.06.

3.4.3 Lockout/Tagout Removal

Upon completion of work, conduct lockout/tagout removal procedure in accordance with the HECP. In accordance with EM 385-1-1, Section 12.E.08, each lock and tag must be removed from each energy isolating device by the authorized individual or systems operator who applied the device. Provide formal notification to the Government (by completing the Government form if provided by Contracting Officer's Representative), confirming that steps of de-energization and lockout/tagout removal procedure have been conducted and certified through inspection and verification. Government or Utility locks and tags used to support the Contractor's work will not be removed until the authorized Government employee receives the formal notification.

3.5 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSP Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.5.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards and using personal fall protection equipment. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSP Z359.2 in the AHA.

3.5.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M,ASSP Z359.0, ASSP Z359.1, ASSP Z359.2, ASSP Z359.3, ASSP Z359.4, ASSP Z359.6, ASSP Z359.7, ASSP Z359.11, ASSP Z359.12, ASSP Z359.13, ASSP Z359.14, ASSP Z359.15, ASSP Z359.16 and ASSP Z359.18.

3.5.2.1 Additional Personal Fall Protection Measures

In addition to the required fall protection systems, other protective measures such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection

systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.5.2.2 Personal Fall Protection Equipment

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabineers must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. Equip all full body harnesses with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

3.5.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 6 feet from unprotected edge of a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by the use of conventional fall protection systems (personal fall arrest/restraint systems, guardrails, or safety nets) in accordance with EM 385-1-1, Section 21 and 29 CFR 1926.500. A safety monitoring system is not adequate fall protection and is not authorized.

(2) For work greater than 6 feet from the unprotected roof edge, addition to the use of conventional fall protection systems the use of a warning line system is also permitted, in accordance with 29 CFR 1926.500 and EM 385-1-1, Section 21.L.

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:12 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.5.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified

person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.5.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.5.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must be in accordance with the requirements of EM 385-1-1, ASSP Z359.2, and ASSP Z359.4.

3.6 WORK PLATFORMS

3.6.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.

b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.

c. An adequate gate is required.

d. Employees performing scaffold erection and dismantling must be qualified.

e. Scaffold must be capable of supporting at least four times the maximum intended load, and provide appropriate fall protection as delineated in the accepted fall protection and prevention plan.

f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

g. Special care must be given to ensure scaffold systems are not overloaded.

h. Side brackets used to extend scaffold platforms on self-supported

scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.

j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 6 feet.

k. Delineate fall protection requirements when working above 6 feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.7 EQUIPMENT

3.7.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.7.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to

the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Contractor's operator must remain with the crane during the spot check. Rigging gear must be in accordance with OSHA, ASME B30.9 Standards.

c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.

i. Use cribbing when performing lifts on outriggers.

j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

l. Maintain inspection records in accordance with EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

p. Follow FAA guidelines when required based on project location.

3.7.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

3.7.4 Base Mounted Drum Hoists

a. Operation of base mounted drum hoists must be in accordance with EM 385-1-1 and ASSP A10.22.

b. Rigging gear must be in accordance with applicable ASME/OSHA standards.

c. When used on telecommunication towers, base mounted drum hoists must be in accordance with TIA-1019, TIA-222, ASME B30.7, 29 CFR 1926.552, and 29 CFR 1926.553.

d. When used to hoist personnel, the AHA must include a written standard operating procedure. Operators must have a physical examination in accordance with EM 385-1-1 Section 16.B.05 and trained, at a minimum, in accordance with EM 385-1-1 Section 16.U and 16.T. The base mounted drum hoist must also comply with OSHA Instruction CPL 02-01-056 and ASME B30.23.

e. Material and personnel must not be hoisted simultaneously.

f. Personnel cage must be marked with the capacity (in number of persons) and load limit in pounds.

g. Construction equipment must not be used for hoisting material or personnel or with trolley/tag lines. Construction equipment may be used for towing and assisting with anchoring guy lines.

3.7.5 Use of Explosives

Explosives must not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval does not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, must be only where directed and in approved storage facilities. These facilities must be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.8 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.8.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department.

3.8.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

3.8.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever Contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.9 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Sections 11 and 12.

3.9.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to

be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

3.9.2 Qualifications

Electrical work must be performed by QP with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State and Local requirements applicable to where work is being performed.

3.9.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.9.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.9.5 Testing

Temporary electrical distribution systems and devices must be inspected,

tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

SECTION 01 45 00.00 10

QUALITY CONTROL
11/16, CHG 2: 11/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2021) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program. Include all associated costs in the applicable Bid Schedule item.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G

SD-06 Test Reports

Verification Statement

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with FAR 52.246-12 Inspection of Construction. QC consist of plans, procedures, and organization necessary to produce an end product

which complies with the Contract requirements. The QC system covers all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements FAR 52.246-12 Inspection of Construction. The Government will consider an interim plan for the first 25 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction-operations, both onsite and offsite, including work by subcontractors fabricators, suppliers and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to an individual other than the project superintendent. The individual should be outside of the project superintendent's chain of command and must be shown as at least one level above the project superintendent in the chain of command.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and

person responsible for each test. (Laboratory facilities approved by the Contracting Officer are required to be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

j. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections. Where the applicable code issued by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the Quality Control Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the QC Plan.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in the Contractor Quality Control(CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations,, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting

will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible for maintaining these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC System Manager is required to be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this Contract. This CQC System Manager is on the site at all times during construction and is employed by the prime Contractor. The CQC System Manager is assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, structural, environmental, architectural, materials technician, submittals clerk, Cx Agent/LEED Specialist,. These individuals or specialized technical companies are directly employed by the prime Contractor and can not be employed by a supplier or subcontractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the experience matrix listed herein. These individuals can perform other duties but need to be allowed sufficient time to perform the

specialized personnel's assigned quality control duties as described in the Quality Control Plan. A single person can cover more than one area provided that the single person is qualified to perform quality control activities in each designated and that workload allows.

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
Mechanical	Graduate Mechanical Engineer with 2 yrs experience or person with 5 years of experience supervising mechanical features of work in the field with a construction company
Electrical	Graduate Electrical Engineer with 2 years related experience or person 5 years of experience supervising electrical features of work in the field with a construction company
Structural	Graduate Civil Engineer (with Structural Track or Focus) or Construction Manager with 2 years experience or person 5 years of experience supervising structural features of work in the field with a construction company
Architectural	Graduate Architect with 2 years experience or person with 5 years related experience
Environmental	Graduate Environmental Engineer with 3 years experience
Submittals	Submittal Clerk with 1 year experience
Concrete, Pavements and Soils	Materials Technician with 2 years experience for the appropriate area
Testing, Adjusting and Balancing (TAB) Personnel	Specialist must be a member of AABC or an experienced technician of the firm certified by the NEBB

Experience Matrix	
Area	Qualifications

3.4.4 Additional Requirement

In addition to the above experience and education requirements, the Contractor Quality Control(CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS is included in the contract, the submittals required by this section have to be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the Contract drawings.

c. Check to assure that all materials and equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Review Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

f. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.

g. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

h. Review of the appropriate activity hazard analysis to assure safety requirements are met.

i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

k. Discussion of the initial control phase.

l. The Government needs to be notified at least 8 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government needs to be notified at least 8 hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.

g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

h. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.7.2 Testing Laboratories

All testing laboratories must be validated by the USACE Material Testing Center (MTC) for the tests to be performed. Information on the USACE MTC with web-links to both a list of validated testing laboratories and for the laboratory inspection request for can be found at: https://mtc.erdc.dren.mil/.

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $1,000 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in FAR 52.211-10 Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be

corrected. The CQC System Manager or staff make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands can also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance FAR 52.246-12 Inspection of Construction.

3.9 DOCUMENTATION

3.9.1 Quality Control Activities

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. The name and area of responsibility of the Contractor/Subcontractor.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and specifications.

3.9.2 Verification Statement

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the Contractor Quality Control(CQC) System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

SECTION 01 45 00.15 10

RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
11/16, CHG 2: 08/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

1.2 MEASUREMENT AND PAYMENT

The work of this section is not measured for payment. The Contractor is responsible for the work of this section, without any direct compensation other than the payment received for contract items.

1.3 CONTRACT ADMINISTRATION

The Government will use the Resident Management System (RMS) to assist in its monitoring and administration of this contract. The Government accesses the system using the Government Mode of RMS (RMS GM) and the Contractor accesses the system using the Contractor Mode (RMS CM). The term RMS will be used in the remainder of this section for both RMS GM and RMS CM. The joint Government-Contractor use of RMS facilitates electronic exchange of information and overall management of the contract. The Contractor accesses RMS to record, maintain, input, track, and electronically share information with the Government throughout the contract period in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Closeout
Import/Export of Data

1.3.1 Correspondence and Electronic Communications

For ease and speed of communications, exchange correspondence and other documents in electronic format to the maximum extent feasible. Some correspondence, including pay requests and payrolls, are also to be provided in paper format with original signatures. Paper documents will govern, in the event of discrepancy with the electronic version.

1.3.2 Other Factors

Other portions of this document have a direct relationship to the reporting accomplished through RMS. Particular attention is directed to FAR 52.236-15 Schedules for Construction Contracts; FAR 52.232-27 Prompt

Payment for Construction Contracts; FAR 52.232-5 Payments Under Fixed-Priced Construction Contracts; Section 01 32 16.15 PROJECT SCHEDULES; Section 01 33 00 SUBMITTAL PROCEDURES; Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS; and Section 01 45 00.00 10 QUALITY CONTROL.

1.4 RMS SOFTWARE

RMS is a web based application. Download, install and be able to utilize the latest version of RMS within 7 calendar days of receipt of the Notice to Proceed. RMS software, user manuals, access and installation instructions, program updates and training information are available from the RMS website (https://rms.usace.army.mil). The Government and the Contractor will have different access authorities to the same contract database through RMS. The common database will be updated automatically each time a user finalizes an entry or change.

1.5 CONTRACT DATABASE - GOVERNMENT

The Government will enter the basic contract award data in RMS prior to granting the Contractor access. The Government entries into RMS will generally be related to submittal reviews, correspondence status, and Quality Assurance(QA)comments, as well as other miscellaneous administrative information.

1.6 CONTRACT DATABASE - CONTRACTOR

Contractor entries into RMS establish, maintain, and update data throughout the duration of the contract. Contractor entries generally include prime and subcontractor information, daily reports, submittals, RFI's, schedule updates and payment requests. RMS includes the ability to import attachments and export reports in many of the modules, including submittals. The Contractor responsibilities for entries in RMS typically include the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

Enter all current Contractor administrative data and information into RMS within 7 calendar days of receiving access to the contract in RMS. This includes, but is not limited to, Contractor's name, address, telephone numbers, management staff, and other required items.

1.6.1.2 Subcontractor Information

Enter all missing subcontractor administrative data and information into RMS CM within 7 calendar days of receiving access to the contract in RMS or within 7 calendar days of the signing of the subcontractor agreement for agreements signed at a later date. This includes name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor is listed separately for each trade to be performed.

1.6.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters are numbered starting from 0001. (e.g., H-0001 or

S-0001). The Government's letters to the Contractor will be prefixed with "C" or "RFP".

1.6.1.4 Equipment

Enter and maintain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Reports

Track the status of the project utilizing the reports available in RMS. The value of these reports is reflective of the quality of the data input. These reports include the Progress Payment Request worksheet, Quality Control (QC) comments, Submittal Register Status, and Three-Phase Control worksheets.

1.6.1.6 Request For Information (RFI)

Create and track all Requests For Information (RFI) in the RMS Administration Module for Government review and response.

1.6.2 Finances

1.6.2.1 Pay Activity Data

Develop and enter a list of pay activities in conjunction with the project schedule. The sum of pay activities equals the total contract amount, including modifications. Each pay activity must be assigned to a Contract Line Item Number (CLIN). The sum of the activities assigned to a CLIN equals the amount of each CLIN.

1.6.2.2 Payment Requests

Prepare all progress payment requests using RMS. Update the work completed under the contract at least monthly, measured as percent or as specific quantities. After the update, generate a payment request and prompt payment certification using RMS. Submit the signed prompt payment certification and payment request as well as supporting data either electronically or by hard copy. Unless waived by the Contracting Officer, a signed paper copy of the approved payment certification and request is also required and will govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

Enter and track implementation of the 3-phase QC Control System, QC testing, transferred and installed property and warranties in RMS. Prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements in RMS. Maintain all data on a daily basis. Insure that RMS reflects all quality control methods, tests and actions contained within the Contractor Quality Control (CQC) Plan and Government review comments of same within 7 calendar days of Government acceptance of the CQC Plan.

1.6.3.1 Quality Control (QC) Reports

The Contractor's Quality Control (QC) Daily Report in RMS is the official report. The Contractor can use other supplemental formats to record QC

data, but information from any supplemental formats are to be consolidated and entered into the RMS QC Daily Report. Any supplemental information may be entered into RMS as an attachment to the report. QC Daily Reports must be finalized and signed in RMS within 24 hours after the date covered by the report. Provide the Government a printed signed copy of the QC Daily Report, unless waived by the Contracting Officer.

1.6.3.2 Deficiency Tracking.

Use the QC Daily Report Module to enter and track deficiencies. Deficiencies identified and entered into RMS by the Contractor or the Government will be sequentially numbered with a QC or QA prefix for tracking purposes. Enter each deficiency into RMS the same day that the deficiency is identified. Monitor, track and resolve all QC and QA entered deficiencies. A deficiency is not considered to be corrected until the Government indicates concurrence in RMS.

1.6.3.3 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in RMS. Worksheets for the three-phase control meetings are generated within RMS.

1.6.3.4 Labor and Equipment Hours

Enter labor and equipment exposure hours on a daily basis. Roll up the labor and equipment exposure data into a monthly exposure report.

1.6.3.5 Accident/Safety Reporting

Both the Contractor and the Government enter safety related comments in RMS as a deficiency. The Contractor must monitor, track and show resolution for safety issues in the QC Daily Report area of the RMS QC Module. In addition, follow all reporting requirements for accidents and incidents as required in EM 385-1-1, Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS and as required by any other applicable Federal, State or local agencies.

1.6.3.6 Definable Features of Work

Enter each feature of work, as defined in the approved CQC Plan, into the RMS QC Module. A feature of work may be associated with a single or multiple pay activities, however a pay activity is only to be linked to a single feature of work.

1.6.3.7 Activity Hazard Analysis

Import activity hazard analysis electronic document files into the RMS QC Module utilizing the document package manager.

1.6.4 Submittal Management

Enter all current submittal register data and information into RMS within 7 calendar days of receiving access to the contract in RMS. Group electronic submittal documents into transmittal packages to send to the Government, except very large electronic files, samples, spare parts, mock ups, color boards, or where hard copies are specifically required. Track transmittals and update the submittal register in RMS on a daily basis throughout the duration of the contract. Submit hard copies of all

submittals unless waived by the Contracting Officer.

1.6.5 Schedule

Enter and update the contract project schedule in RMS by either manually entering all schedule data or by importing the Standard Data Exchange Format (SDEF) file, based on the requirements in Section 01 32 16.15 PROJECT SCHEDULE.

1.6.6 Closeout

Closeout documents, processes and forms are managed and tracked in RMS by both the Contractor and the Government. Ensure that all closeout documents are entered, completed and documented within RMS.

1.7 IMPLEMENTATION

Use of RMS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain contract data within the RMS system. RMS is an integral part of the Contractor's required management of quality control.

1.8 NOTIFICATION OF NONCOMPLIANCE

Take corrective action within 7 calendar days after receipt of notice of RMS non-compliance by the Contracting Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
11/20, CHG 2: 08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(2017) Reduced-Pressure Principle Backflow Prevention Assembly

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; ERTA 20-3 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4; TIA 20-5; TIA 20-6; TIA 20-7; TIA 20-8; TIA 20-9; TIA 20-10; TIA 20-11; TIA 20-12; TIA 20-13; TIA 20-14; TIA 20-15; TIA 20-16; ERTA 20-4 2022) National Electrical Code
NFPA 241	(2022) Standard for Safeguarding Construction, Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Site Plan; G

Traffic Control Plan; G

Haul Road Plan; G

Contractor Computer Cybersecurity Compliance Statements; G

Contractor Temporary Network Cybersecurity Compliance Statements; G

SD-06 Test Reports

Backflow Preventer Tests

SD-07 Certificates

Backflow Tester Certification

Backflow Preventers Certificate of Full Approval

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit for Government approval a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.4 BACKFLOW PREVENTERS CERTIFICATE

1.4.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with a company participating in other phases of this Contract.

1.4.2 Backflow Prevention Training Certificate

Submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.5 DOD CONDITION OF READINESS (COR)

DOD will set the Condition of Readiness (COR) based on the weather forecast for sustained winds 50 knots (58 mph) or greater. Contact the Contracting Officer for the current COR setting.

Monitor weather conditions a minimum of twice a day and take appropriate actions according to the approved Emergency Plan in the accepted Accident Prevention Plan, EM 385-1-1 Section 01 Emergency Planning and the instructions below.

Unless otherwise directed by the Contracting Officer, comply with:

a. Condition FOUR (Sustained winds of 58 mph or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber,

waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 3.3 feet high. Remove all debris, trash, or objects that could become missile hazards. Review requirements pertaining to "Condition THREE" and continue action as necessary to attain "Condition FOUR" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

b. Condition THREE (Sustained winds of 58 mph or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Reinforce or remove formwork and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and COR updates and completion of required actions. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness.

c. Condition TWO (Sustained winds of 58 mph or greater expected within 24 hours): Secure the jobsite, and leave Government premises.

d. Condition ONE. (Sustained winds of 58 mph or greater expected within 12 hours): Contractor access to the jobsite and Government premises is prohibited.

1.6 CYBERSECURITY DURING CONSTRUCTION

{For Reference Only: This subpart (and its subparts) relates to AC-18, SA-3, CCI-00258.} Meet the following requirements throughout the construction process.

1.6.1 Contractor Computer Equipment

Contractor owned computers may be used for construction. When used, contractor computers must meet the following requirements:

1.6.1.1 Operating System

The operating system must be an operating system currently supported by the manufacturer of the operating system. The operating system must be current on security patches and operating system manufacturer required updates.

1.6.1.2 Anti-Malware Software

The computer must run anti-malware software from a reputable software manufacturer. Anti-malware software must be a version currently supported by the software manufacturer, must be current on all patches and updates, and must use the latest definitions file. All computers used on this project must be scanned using the installed software at least once per day.

1.6.1.3 Passwords and Passphrases

The passwords and passphrases for all computers must be changed from their default values. Passwords must be a minimum of eight characters with a minimum of one uppercase letter, one lowercase letter, one number and one special character.

1.6.1.4 Contractor Computer Cybersecurity Compliance Statements

Provide a single submittal containing completed Contractor Computer Cybersecurity Compliance Statements for each company using contractor owned computers. Contractor Computer Cybersecurity Compliance Statements must use the template published at http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. Each Statement must be signed by a cybersecurity representative for the relevant company.

1.6.2 Temporary IP Networks

Temporary contractor-installed IP networks may be used during construction. When used, temporary contractor-installed IP networks must meet the following requirements:

1.6.2.1 Network Boundaries and Connections

The network must not extend outside the project site and must not connect to any IP network other than IP networks provided under this project or Government furnished IP networks provided for this purpose. Any and all network access from outside the project site is prohibited.

1.6.3 Government Access to Network

Government personnel, as defined, prescribed, and identified by the Contracting Officer, must be allowed to have complete and immediate access to the network at any time in order to verify compliance with this specification. Or if there is a Government agency that's responsible, identify that agency.

1.6.4 Temporary Wireless IP Networks

In addition to the other requirements on temporary IP networks, temporary wireless IP (WiFi) networks must not interfere with existing wireless network and must use WPA2 security. Network names (SSID) for wireless networks must be changed from their default values.

1.6.5 Passwords and Passphrases

The passwords and passphrases for all network devices and network access must be changed from their default values. Passwords must be a minimum 8 characters with a minimum of one uppercase letter, one lowercase letter, one number and one special character.

1.6.6 Contractor Temporary Network Cybersecurity Compliance Statements

Provide a single submittal containing completed Contractor Temporary Network Cybersecurity Compliance Statements for each company implementing a temporary IP network. Contractor Temporary Network Cybersecurity Compliance Statements must use the template published at http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/

forms-graphics-tables. Each Statement must be signed by a cybersecurity representative for the relevant company. If no temporary IP networks will be used, provide a single copy of the Statement indicating this.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Prior to the commencement of work activities, provide a clear weatherproof covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the Contract, Wage Rate Information poster, Safety and Health Information as required by EM 385-1-1 Section 01 and other information approved by the Contracting Officer. Coordinate requirements herein with 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, and in location as approved by the Contracting Officer.

2.1.2 Project Identification Signs

The requirements for the signs, their content, and location are as indicated and as specified in Section 01 58 00 PROJECT IDENTIFICATION. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.1.3 Warning Signs

Post temporary signs, tags, and labels to give workers and the public adequate warning and caution of construction hazards according to the EM 385-1-1 Section 04. Attach signs to the perimeter fencing every 150 feet warning the public of the presence of construction hazards. Signs must require unauthorized persons to keep out of the construction site. Correct the data required by safety signs daily. Post signs at all points of entry designating the construction site as a hard hat area.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

Construct access and haul roads necessary for proper prosecution of the work under this Contract in accordance with EM 385-1-1 Section 04. Construct with suitable grades and widths; avoid sharp curves, blind corners, and dangerous cross traffic. Submit haul road plan for approval. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and haul roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades are required whenever safe public access to

paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.3 FENCING

Provide fencing along the construction site and at all open excavations and tunnels to control access by unauthorized personnel. Safety fencing must be highly visible to be seen by pedestrians and vehicular traffic. All fencing must meet the requirements of EM 385-1-1. Remove the fence upon completion and acceptance of the work.

2.3.1 Polyethylene Mesh Safety Fencing

Temporary safety fencing must be a high visibility orange colored, high density polyethylene grid, a minimum of 48 inches high and maximum mesh size of 2 inches. Fencing must extend from the grade to a minimum of 48 inches above the grade and be tightly secured to T-posts spaced as necessary to maintain a rigid and taut fence. Fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection.

2.3.2 Chain Link Panel Fencing

Temporary panel fencing must be galvanized steel chain link panels 6 feet high. Multiple fencing panels may be linked together at the bases to form long spans as needed. Each panel base must be weighted down using sand bags or other suitable materials in order for the fencing to withstand anticipated winds while remaining upright. Fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection.

2.3.3 Post-Driven Chain Link Fencing

Temporary post-driven fencing must be galvanized chain link fencing 6 feet high supported by an tightly secured to galvanized steel posts driven below grade. Fence posts must be located on minimum 10 foot centers. Posts may be set in various surfaces such as sand, soil, asphalt or concrete as necessary. Chain link fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection. Completely remove fencing and posts at the completion of construction and restore surfaces disturbed or damaged to its original condition. Locate and identify underground utilities prior to setting fence posts. Equip fence with a lockable gate. Gate must remain locked when construction personnel are not present.

2.4 TEMPORARY WIRING

Provide temporary wiring in accordance with EM 385-1-1 Section 11, NFPA 241 and NFPA 70. Include monthly inspection and testing of all equipment and apparatus.

2.5 BACKFLOW PREVENTERS

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance

testing and evaluation for the respective level of approval. Certificate of Provisional Approval is not acceptable.

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged , mounted gate valve and strainer, 304 stainless steel or bronze, internal parts.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Construction Contract employees must park privately owned vehicles in an area designated by the Contracting Officer. Employee parking must not interfere with existing and established parking requirements of the Government installation.

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.2.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available from existing outlets and supplies, as specified in the Contract. Unless otherwise provided in the Contract, the amount of each utility service consumed will be charged to or paid at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. Carefully conserve utilities furnished without charge.

b. Reasonable amounts of the following utilities will be made available at the prevailing rates.

Utility Services		
	Cost ($) per	Unit
Electricity		
Potable Water		
Salt Water		
Compressed Air		
Steam		
Natural Gas		
Sanitary Sewer		

c. The point at which the Government will deliver such utilities or services and the quantity available is must be coordinated with the Contracting Officer. Pay all costs incurred in connecting,

converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections.

3.2.3 Meters and Temporary Connections

Provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. Do not make the final electrical connection.

3.2.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed prior to the end of the current fiscal year.

3.2.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated appurtenances. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.2.6 Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities in accordance with EM 385-1-1 Section 02. Locate the facilities behind the construction fence or out of the public view. Clean units and empty wastes at least once a week or more frequently into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into a municipal, district, or commercial sanitary sewer system. Penalties or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.2.7 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.8 Fire Protection

Provide temporary fire protection equipment for the protection of

personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.3 STATION OPERATION AFFECT ON CONTRACTOR OPERATIONS

3.3.1 Restricted Access Areas

The Government will monitor work in areas indicated. Notify Contracting Officer at least 14 calendar days prior to starting work in these areas.

3.4 TRAFFIC PROVISIONS

3.4.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close a thoroughfare or interfere with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan for Government approval detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Make all notifications and obtain all permits required for modification to traffic movements outside Station's jurisdiction.. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at Contractor's expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

d. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

3.4.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Provide self-illuminated (lighted) barricades during hours of darkness. Brightly-colored (orange) vests are required for all personnel working in roadways. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of damage to roads caused by construction operations.

3.4.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

3.4.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Coordinate dust control methods with 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

3.5 REDUCED PRESSURE BACKFLOW PREVENTERS

Provide an approved reduced pressure backflow prevention assembly at each location where the Contractor taps into the Government potable water supply.

Perform backflow preventer tests using test equipment, procedures, and certification forms conforming to those outlined in the latest edition of the Manual of Cross-Connection Control published by the FCCCHR Manual. Test and tag each reduced pressure backflow preventer upon initial installation (prior to continued water use) and semi-annually thereafter. Tag must contain the following information: make, model, serial number, dates of tests, results, maintenance performed, and signature of tester. Record test results on certification forms conforming to requirements cited earlier in this paragraph.

3.6 CONTRACTOR'S TEMPORARY FACILITIES

Contractor-owned or -leased trailers must be identified by Government assigned numbers. Size and location of the number will comply with . Apply the number to the trailer within 14 calendar days of notification, or sooner, if directed by the Government. Temporary facilities must meet requirements as identified in EM 385-1-1 Section 04.

Contractor is responsible for security of their property. Provide adequate outside security lighting at the temporary facilities. Trailers must be anchored to resist high winds and meet applicable state or local standards for anchoring mobile trailers. Coordinate anchoring with EM 385-1-1 Section 04. The Contract Clause entitled "FAR 52.236-10, Operations and Storage Areas" and the following apply:

3.6.1 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

In the event a new building is constructed for the temporary project field office, it must be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery-operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Provide approved sanitary facilities. Screen the windows

and doors and provide the doors with deadbolt type locking devices or a padlock and heavy-duty hasp bolted to the door. Door hinge pins must be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh screens to prevent easy access. In warm weather, provide air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Unless otherwise directed by the Contracting Officer, remove the building from the site upon completion and acceptance of the work.

3.6.2 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green or brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on the current day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

Keep fencing in a state of good repair and proper alignment. If the Contractor elects to traverse grassed or unpaved areas which are not established roadways with construction equipment or other vehicles, cover the grassed or unpaved areas with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation must be at the Contractor's discretion.. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, structures, under trailers, and in areas not accessible to mowers must be edged or trimmed neatly.

3.6.3 Supplemental Storage Area

Upon request, and pending availability, the Contracting Officer will designate another or supplemental area for the use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Maintain the area in a clean and orderly fashion and secured if needed to protect supplies and equipment. Utilities will not be provided to this area by the Government.

3.6.4 Appearance of Trailers

a. Trailers must be roadworthy and comply with all appropriate state and local vehicle requirements. Trailers which are rusted, have peeling paint or are otherwise in need of repair will not be allowed on Installation property. Trailers must present a clean and neat exterior appearance and be in a state of good repair.

b. Maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal at the Contractor's expense.

3.6.5 Safety Systems

Protect the integrity of all installed safety systems or personnel safety devices. Obtain prior approval from the Contracting Officer if entrance into systems serving safety devices is required. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish Contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.6.6 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.6.6.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.7 GOVERNMENT FIELD OFFICE

3.7.1 Resident Engineer's Office

Provide the Government Resident Engineer with an office, approximately 200 square feet in floor area, located where directed and providing space heat, air conditioning unit, electric light and power, and toilet facilities consisting of one lavatory and one water closet complete with connections to water and sewer mains. Provide a mail slot in the door or a lockable mail box mounted on the surface of the door. Include a 4 by 8 foot plan table, computer work space, a standard size office desk and chair, and telephone. At completion of the project, the office will remain the property of the Contractor and be removed from the site. Utilities must be connected and disconnected in accordance with local codes and to the satisfaction of the Contracting Officer. Compliance with safety and appearance requirements for temporary facilities stated in previous paragraphs is required.

3.7.2 Trailer-Type Mobile Office

The option is available to, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer to meet the requirements of the minimum facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds. Coordinate requirements for proper anchoring with EM 385-1-1 Section 04.

3.8 PLANT COMMUNICATIONS

Whenever the individual elements of the plant are located so that operation by normal voice between these elements is not satisfactory, install a satisfactory means of communication, such as telephone or other suitable devices and make available for use by Government personnel.

3.9 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the Contract and, upon completion and acceptance of the work, remove from the work site.

3.10 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store all salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.11 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, and all other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence. Restore areas used during the performance of the Contract to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS
11/15, CHG 5: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM	(2016; 5th Ed) NIOSH Manual of Analytical Methods

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.1053	Respirable Crystalline Silica
29 CFR 1926.62	Lead
29 CFR 1926.1101	Asbestos
29 CFR 1926.1153	Respirable Crystalline Silica
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
40 CFR 64	Compliance Assurance Monitoring
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements

40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.31	Standards Applicable to Generators of Hazardous Waste-Labeling
40 CFR 262.34	Standards Applicable to Generators of Hazardous Waste-Accumulation Time
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 273.2	Standards for Universal Waste Management - Batteries
40 CFR 273.4	Standards for Universal Waste Management - Mercury Containing Equipment
40 CFR 273.5	Standards for Universal Waste Management - Lamps
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.125	National Oil and Hazardous Substances Pollution Contingency Plan - Notification and Communications
40 CFR 355	Emergency Planning and Notification
40 CFR 403	General Pretreatment Regulations for Existing and New Sources of Pollution

40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 763	Asbestos
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 172.101	Hazardous Material Regulation-Purpose and Use of Hazardous Material Table
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

1.2.2 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.

1.2.3 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.2.4 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.2.5 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.6 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.2.7 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.2.8 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

1.2.9 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.2.10 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by installations to obtain NPDES permit coverage for their stormwater discharges.

1.2.11 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.12 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.13 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.2.14 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.15 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.2.15.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may not be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.15.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

1.2.15.3 Material Not Regulated As Solid Waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

1.2.15.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

1.2.15.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.2.15.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph HAZARDOUS MATERIAL MANAGEMENT.

1.2.15.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.2.15.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated

wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.2.16 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.2.17 Wastewater

Wastewater is the used water and solids from a community that flow to a treatment plant.

1.2.17.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.2.18 Waters of the United States

Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.2.19 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.2.20 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey

Solid Waste Management Permit; G

Regulatory Notifications; G

Environmental Protection Plan; G, ECGE

Stormwater Pollution Prevention Plan (SWPPP); G, ECGE

Stormwater Notice of Intent (for NPDES coverage under the general permit for construction activities); G, ECGE

Dirt and Dust Control Plan; G, ECGE

Employee Training Records; G, ECGE

Environmental Manager Qualifications; G, ECGE

SD-06 Test Reports

Laboratory Analysis: G, ECGE

Inspection Reports

Monthly Solid Waste Disposal Report; G

SD-07 Certificates

Employee Training Records; G

Certificate of Competency

Erosion and Sediment Control Inspector Qualifications

SD-11 Closeout Submittals

Stormwater Pollution Prevention Plan Compliance Notebook; G

Stormwater Notice of Termination (for NPDES coverage under the general permit for construction activities); G

Waste Determination Documentation; G

Disposal Documentation for Hazardous and Regulated Waste; G

Assembled Employee Training Records; G

Solid Waste Management Permit; G
Project Solid Waste Disposal Documentation Report; G

Contractor Hazardous Material Inventory Log; G

Hazardous Waste/Debris Management; G, ECGE

Regulatory Notifications; G

Sales Documentation; G

Contractor Certification

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.4.1 Conformance with the Environmental Management System

Perform work under this contract consistent with the policy and objectives identified in the VA's Environmental Management System (EMS). Perform work in a manner that conforms to objectives and targets of the environmental programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the VA EMS and of how these EMS roles and responsibilities affect work performed under the contract.

Coordinate with the VA's EMS coordinator to identify training needs associated with environmental aspects and the EMS, and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. The VA Environmental Office will retain associated environmental compliance records. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records. See paragraph EMPLOYEE TRAINING RECORDS.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a Preconstruction Survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the

Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

1.5.2 Regulatory Notifications

Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at least 10 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.5.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the VA; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer and VA Environmental Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.5.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, local, and VA requirements. The Environmental Manager must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out. Submit Environmental Manager Qualifications to the Contracting

Officer.

1.5.5 Employee Training Records

Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with federal, state and local regulatory requirements for RCRA Large Quantity Generator. Provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description will include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet EPA requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; VA and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area. Provide copy of the Erosion and Sediment Control Inspector Qualifications as defined by EPA.

1.5.6 Non-Compliance Notifications

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. FAR 52.242-14 Suspension of Work provides that a suspension, delay, or interruption of work due to the fault or negligence of the Contractor allows for no adjustments to the contract for time extensions or equitable adjustments. In addition to a suspension of work, the Contracting Officer may use additional authorities under the contract or law.

1.6 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the VA's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the Contracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and

other measures to be taken. Submit the EPP within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

1.6.1 General Overview and Purpose

1.6.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, air pollution control plan, contaminant prevention plan, a historical, archaeological, cultural resources, biological resources and wetlands plan, traffic control plan Hazardous, Toxic and Radioactive Waste (HTRW) Plan Non-Hazardous Solid Waste Disposal Plan borrowing material plan.

1.6.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.6.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.6.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.6.1.5 Contact Information

Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.6.2 General Site Information

1.6.2.1 Drawings

Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands, material storage areas, structures, sanitary facilities, storm drains and

conveyances, and stockpiles of excess soil.

1.6.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.6.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.6.3 Management of Natural Resources

a. Land resources

b. Tree protection

c. Replacement of damaged landscape features

d. Temporary construction

e. Stream crossings

f. Fish and wildlife resources

g. Wetland areas

1.6.4 Protection of Historical and Archaeological Resources

a. Objectives

b. Methods

1.6.5 Stormwater Management and Control

a. Ground cover

b. Erodible soils

c. Temporary measures

(1) Structural Practices

(2) Temporary and permanent stabilization

d. Effective selection, implementation and maintenance of Best Management Practices (BMPs).

1.6.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste. Control and disposal of hazardous waste.

This item consist of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the VA Hazardous Waste Management Plan. The Contracting Officer will provide a copy of the VA Hazardous Waste Management Plan. As a minimum, include the following:

a. List of the types of hazardous wastes expected to be generated

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications

d. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers)

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted)

f. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268)

g. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar

h. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures

i. Plans for the disposal of hazardous waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.6.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment

Notifications in the event of a release to the environment

1.6.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.6.9 Clean Air Act Compliance

1.6.9.1 Haul Route

Submit truck and material haul routes along with a Dirt and Dust Control Plan for controlling dirt, debris, and dust on VA roadways. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

1.6.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine requirements based on any current VA permits and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the VA Environmental Office (Air Program Manager).

1.6.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between emergency and non-emergency operation.

1.6.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the VA Environmental Office to determine the appropriate turn in location.

1.6.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.6.9.6 Compliant Materials

Provide the Government a list of SDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet VA permit requirements for emissions.

1.7 LICENSES AND PERMITS

Obtain licenses and permits required for the construction of the project

and in accordance with FAR 52.236-7 Permits and Responsibilities. Notify the Government of all general use permitted equipment the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7 Permits and Responsibilities.

1.8 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.9 SOLID WASTE MANAGEMENT PERMIT

Provide the Contracting Officer with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.9.1 Monthly Solid Waste Disposal Report

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the VA Environmental Office, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the VA Environmental Office or as otherwise specified. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Vegetation

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor is

responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer and VA Environmental Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.2 PROTECTION OF CULTURAL RESOURCES

If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended. Resources covered by this paragraph include, but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources.

3.3 STORMWATER

Do not discharge stormwater from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization in advance from the VA Environmental Office for any release of contaminated water.

3.3.1 Construction General Permit

Provide a Construction General Permit as required by 40 CFR 122.26 or EPA General Permit (2022 NPDES CGP). Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.3.1.1 Stormwater Pollution Prevention Plan

Submit a project-specific Stormwater Pollution Prevention Plan (SWPPP) to the Contracting Officer for approval, within 30 days of Contract Award and prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the EPA General Permit for stormwater discharges from construction sites.

Include the following:

a. Comply with terms of the EPA general permit for stormwater discharges from construction activities. Prepare SWPPP in accordance with EPA requirements. Use EPA guide Developing your Stormwater Pollution

Prevention Plan located at https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp to prepare the SWPPP.

b. Select applicable BMPs from EPA Fact Sheets located at https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr or in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.3.1.2 Stormwater Notice of Intent for Construction Activities

Prepare and submit the Notice of Intent for NPDES coverage under the general permit for construction activities to the Contracting Officer for review and approval.

Submit the approved NOI and appropriate permit fees onto the appropriate federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

3.3.1.3 Inspection Reports

Submit "Inspection Reports" to the Contracting Officer in accordance with EPA Construction General Permit.

3.3.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Create and maintain a three ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports and related corrective action records, copies of correspondence with the EPA, and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the Government. Provide the compliance notebook to the Contracting Officer.

3.3.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency. Prepare as-built topographic survey information required by the permitting agency for certification of the stormwater management system, and provide to the Contracting Officer.

3.3.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.3.2.1 Sediment Control Practices

Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff. Include the following devices: silt fence, temporary diversion dikes, storm drain inlet protection,

3.3.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.3.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.3.5 Municipal Separate Storm Sewer System (MS4) Management

Comply with the VA's MS4 permit requirements.

3.4 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.4.1 Preconstruction Air Permits

Notify the Air Program Manager, through the Contracting Officer, at least 6 months prior to bringing equipment, assembled or unassembled, onto the VA, so that air permits can be secured. Necessary permitting time must be considered in regard to construction activities. Clean Air Act (CAA) permits must be obtained prior to bringing equipment, assembled or unassembled, onto the VA.

3.4.2 Oil or Dual-fuel Boilers and Furnaces

Provide product data and details for new, replacement, or relocated fuel fired boilers, heaters, or furnaces to the VA Environmental Office (Air Program Manager) through the Contracting Officer. Data to be reported include: equipment purpose (water heater, building heat, process), manufacturer, model number, serial number, fuel type (oil type, gas type) size (MMBTU heat input). Provide in accordance with paragraph PRECONSTRUCTION AIR PERMITS.

3.4.3 Burning

Burning is prohibited on the Government premises.

3.4.4 Class I and II ODS Prohibition

Class I and II ODS are Government property and must be returned to the Government for appropriate management. Coordinate with the VA Environmental Office to determine the appropriate location for turn in of all reclaimed refrigerant.

3.4.5 Accidental Venting of Refrigerant

Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer.

3.4.6 EPA Certification Requirements

Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees' places of business; technicians must carry certification wallet cards, as provided by environmental law.

3.4.7 Dust Control

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster. Since these products contain Crystalline Silica, comply with the applicable OSHA standard, 29 CFR 1910.1053 or 29 CFR 1926.1153 for controlling exposure to Crystalline Silica Dust.

3.4.7.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

3.4.7.2 Abrasive Blasting

Blasting operations cannot be performed without prior approval of the VA

Air Program Manager. The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive agent, paint chips, and other debris. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.4.8 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard.

3.5 REQUIREMENTS FOR OFFSITE SOILS AND ROCK FROM NON-COMMERCIAL BORROW SOURCES

Offsite soils and rock from non-commercial borrow sites shall be certified for use in one of the following ways:

1. A Phase 1 Environmental Site Assessment (ESA) in accordance with ASTM 1527-05 or 2247-08 (depending on the locality of the borrow area) shall be conducted on the borrow area to prove that the borrow area has had no impact from industrial, chemical or waste disposal activities.

2. The borrow soils shall be tested for Total Petroleum Hydrocarbons (TPH EPA Method 418.1), Semi Volatile Organics (EPA Method 8270D), Volatile Organics (EPA Method 8260B), Pesticides (EPA Method 8081A), Herbicides (EPA Method 8151A), Polychlorinated Biphenyls (PCB EPA Method 8082) and the Priority Pollutant Metals (EPA Method 245.1). Representative discrete samples shall be of actual borrow material to be used for project, be collected at the borrow area while the potential fill material is still in place, and analyzed prior to removal from the borrow area. Testing and sampling shall be conducted no more than 6 months prior to the use of the borrow soil. Composite sampling for fill material is not appropriate as losses of volatile and semi-volatile analytes can occur. The number of samples required shall be in accordance with the following Sampling Frequency Table.

Sampling Frequency Table

Area of Individual Borrow Area	**Sampling Requirements**
2 Acres or Less	Minimum of 4 Discrete Samples
2 to 4 Acres	Minimum of 1 Discrete Sample Every 1/2 Acre
4 to 10 Acres	Minimum of 8 Discrete Samples
Greater than 10 Acres	Minimum of 8 Discrete Samples with 4 Subsamples per Location
Volume of Borrow Area Stockpile	**Samples per Volume**
Up to 1,000 Cubic Yards (~1,500 Tons)	1 Sample/250 Cubic Yards (~375 Tons)

1,000 to 5,000 Cubic Yards	4 Samples for first 1000 Cubic Yards + 1 Sample per each additional 500 CY
Greater than 5,000 Cubic Yards	12 Samples for First 5,000 CY + 1 Sample for Each Additional 1,000 CY

The Contractor shall provide Phase 1 Environmental Site Assessment of Non-Commercial Borrow Site for Offsite Materials and/or Non-Commercial Borrow Site Testing for Offsite Materials to the Contracting Officer and Environmental Engineering within 10 calendar days of conclusion of Phase 1 ESA/results or analytical testing. The analytical results shall be provided as a standard laboratory data package, including a summary of the Quality Assurance/Quality Control (QA/QC) sample results. The sample results shall accompany all analytical reports.

The Contractor shall not transport off site non-commercial borrow material onsite until the use of this material has been approved by the Contracting Officer.

3.5.1 REQUIREMENTS FOR OFF-SITE SOILS AND ROCK FROM COMMERCIAL BORROW SOURCES

The Contractor shall provide Clean Borrow Certification for Commercial Borrow Sites that demonstrates that the borrow material is free of all contamination. The Contractor shall not transport any off-site commercial borrow material until the use of this material is approved by the Contracting Officer.

3.6 REQUIREMENTS FOR ON-SITE SOILS AND ROCK FROM A NON-COMMERCIAL BORROW SOURCE

The Contractor shall have approval from the Contracting Officer before any on-site soils and rock are used for project construction purposes. The Contractor shall provide the Clean Borrow Certification for On-Site Materials and/or Phase 1 Environmental Site Assessment for On-Site Materials that demonstrates the borrow material is free of all contamination in accordance with the provisions of Section 3.5, Requirements for Off-Site Soils from a Non-Commercial Borrow Source shall be met.

3.7 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the VA's Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.7.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

Include the name, physical address, and telephone number of the hauler, if

transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.7.2 Nonhazardous Solid Waste Diversion Report

Maintain an inventory of nonhazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that nonhazardous solid waste has been generated. Include the following in the report:

Construction and Demolition (C&D) Debris Disposed	cubic yards, as appropriate
C&D Debris Recycled	tons, as appropriate
C&D Debris Composted	cubic yards, as appropriate
Total C&D Debris Generated	tons, as appropriate
Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount)	tons, as appropriate

3.8 WASTE MANAGEMENT AND DISPOSAL

3.8.1 Waste Determination Documentation

Complete a Waste Determination form (provided at the pre-construction conference) for Contractor-derived wastes to be generated. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g. scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Base waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Consult with the VA environmental staff for guidance on specific requirements. Attach support documentation to the Waste Determination form. As a minimum, provide a Waste Determination form for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials.

3.8.2 Solid Waste Management

3.8.2.1 Project Solid Waste Disposal Documentation Report

Provide copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation Contractor certification must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste disposal report. Prices paid or received do not have to be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.8.2.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers that are regularly

emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, in accordance with 49 CFR 173.

3.8.3 Control and Management of Hazardous Waste

Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

3.8.3.1 Hazardous Waste/Debris Management

Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, hazardous waste manifests must be signed by personnel from the VA Environmental Office. Do not bring hazardous waste onto Government property. Provide the Contracting Officer with a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D.

3.8.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.34 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). If the Contractor expects to generate hazardous waste at a rate and quantity that makes satellite accumulation impractical, the Contractor may request a temporary 90 day accumulation point be established. Submit a request in writing to the Contracting Officer and provide the following information (Attach Site Plan to the Request):

Contract Number	
Contractor	
Haz/Waste or Regulated Waste POC	
Phone Number	
Type of Waste	
Source of Waste	
Emergency POC	
Phone Number	
Location of the Site	

Attach a Waste Determination form for the expected waste streams. Allow 10 working days for processing this request. Additional compliance requirements (e.g. training and contingency planning) that may be required are the responsibility of the Contractor. Barricade the designated area where waste is being stored and post a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.8.3.3 Hazardous Waste Disposal

3.8.3.3.1 Responsibilities for Contractor's Disposal

Provide hazardous waste manifest to the Installations Environmental Office for review, approval, and signature prior to shipping waste off Government property.

3.8.3.3.1.1 Services

Provide service necessary for the final treatment or disposal of the hazardous material or waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.8.3.3.1.2 Samples

Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.8.3.3.1.3 Analysis

Analyze each sample taken and provide analytical results to the Contracting Officer. See paragraph WASTE DETERMINATION DOCUMENTATION.

3.8.3.3.1.4 Labeling

Determine the Department of Transportation's (DOT's) proper shipping names for waste (each container requiring disposal) and demonstrate to the

Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262.31 and applicable state or local regulations.

3.8.3.3.2 Contractor Disposal Turn-In Requirements

Hazardous waste generated must be disposed of in accordance with the following conditions to meet VA requirements:

a. Drums must be compatible with waste contents and drums must meet DOT requirements for 49 CFR 173 for transportation of materials.

b. Band drums to wooden pallets.

c. No more than three 55 gallon drums or two 85 gallon over packs are to be banded to a pallet.

d. Band using 1-1/4 inch minimum band on upper third of drum.

e. Provide label in accordance with 49 CFR 172.101.

f. Leave 3 to 5 inches of empty space above volume of material.

3.8.3.4 Universal Waste Management

Manage the following categories of universal waste in accordance with federal, state, and local requirements and VA instructions:

a. Batteries as described in 40 CFR 273.2

b. Lamps as described in 40 CFR 273.5

c. Mercury-containing equipment as described in 40 CFR 273.4

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.8.3.5 Electronics End-of-Life Management

Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and VA instructions.

3.8.3.6 Disposal Documentation for Hazardous and Regulated Waste

Contact the Contracting Officer for the facility RCRA identification number that is to be used on each manifest.

3.8.4 Releases/Spills of Oil and Hazardous Substances

3.8.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the VA Fire Department, the VA Command Duty Officer, the VA Environmental Office, the Contracting Officer and the state or local authority.

Submit verbal and written notifications as required by the federal (40 CFR 300.125 and 40 CFR 355), state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

3.8.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

3.8.5 Mercury Materials

Immediately report to the Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.8.6 Wastewater

3.8.6.1 Disposal of Wastewater

Disposal of wastewater must be as specified below.

3.8.6.1.1 Treatment

Do not allow wastewater from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction- related waste water off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.8.6.1.2 Surface Discharge

For discharge of ground water, Surface discharge in accordance with the requirements of the NPDES or state STORMWATER DISCHARGES FROM CONSTRUCTION SITES permit.

3.8.6.1.3 Land Application

Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing must be discharged into the sanitary sewer with prior approval and notification to the Wastewater Treatment Plant's Operator.

3.9 HAZARDOUS MATERIAL MANAGEMENT

Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract. Submit an SDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on the VA. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.9.1 Contractor Hazardous Material Inventory Log

Submit the "Contractor Hazardous Material Inventory Log"(found at: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables), which provides information required by (EPCRA Sections 312 and 313) along with corresponding SDS, to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Keep copies of the SDSs for hazardous materials onsite. At the end of the project, provide the Contracting Officer with copies of the SDSs, and the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used.

The Contracting Officer may request documentation for any spills or releases, environmental reports, or off-site transfers.

3.10 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.11 CONTROL AND MANAGEMENT OF ASBESTOS-CONTAINING MATERIAL (ACM)

Manage and dispose of asbestos- containing waste in accordance with 40 CFR 61. Successful bidder shall incorporate Section 02 82 00 ASBESTOS ABATEMENT into the design specs if any asbestos abatement is required. Manifest asbestos-containing waste and provide the manifest to the Contracting Officer. Notifications to the state and VA Air Program Manager are required before starting any asbestos work.

a. Asbestos Abatement Survey reports can be found in Appendices A and B.

b. Designated Competent Person: Qualified in accordance with 29 CFR 1926.32 and 29 CFR 1926.1101, has EPA MAP "Contractor/Supervisor" training accreditation, has EPA/State certification/license as a "Contractor/Supervisor" and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units VA and maintenance requirements, site safety and health requirements, notification of other employees onsite, etc. The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan (APP) and Asbestos Hazard Abatement Plan (AHAP). Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training, with the employee "Certificate of Worker Acknowledgment". Submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

c. Project and Other Supervisors: Have EPA MAP "Contractor/Supervisor" training accreditation. Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training, EPA/State certification/license with the employee "Certificate of Worker Acknowledgment". Also submit evidence that the Project Supervisor has a minimum of 2 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.

d. Designated Industrial Hygienist: Resume for the Industrial Hygienist (IH) selected to prepare the Contractor's AHAP, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is board certified in the practice of industrial hygiene or board eligible (meets all education and experience requirements) as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA MAP "Contractor/Supervisor" training accreditation, has EPA/State certification/license, and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training and

EPA/State certification/license with the employee "Certificate of Worker Acknowledgment". The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid ABIH certification shall be included.

e. Asbestos Abatement Workers: Meet the requirements contained in 29 CFR 1926.1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment". Training documentation is required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. Physician: Resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926.1101. The physician shall be familiar with the site's hazards and the scope of this project.

g. Independent Testing Laboratory: identify the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926.1101, OSHA method ID-160, the most current version of NIOSH NMAM Method 7400 as shown in Table 3 at the end of this Section. The laboratory shall be currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program or by participating in the AIHA PAT Program, and being judged proficient in counting samples.

(2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts with demonstrated proficiency to conduct PLM analyses.

(3) Transmission electron microscopy (TEM): The laboratory is fully

equipped and proficient in conducting TEM analysis of airborne samples using the mandatory method specified by 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for airborne sample analysis of asbestos by TEM; the laboratory will use analysts with demonstrated proficiency under NVLAP. It is proficient in conducting analysis for low asbestos concentration, enhanced analysis of floor tiles and bulk materials where multiple layers are present, using an improved EPA test method titled, "Method for the Determination of Asbestos in Bulk Building Materials".

(4) PCM/TEM: The laboratory is fully equipped and each analyst is proficient in conducting PCM and TEM analysis of airborne samples using NIOSH NMAM Method 7400 PCM and NIOSH NMAM Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

h. Disposal Facility, Transporter: Written evidence that the landfill to be used is approved for asbestos disposal by the state and local regulatory agencies. Copies of signed agreements between the Contractor (including subcontractors and transporters) and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste shall be provided. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61 150(b), and other applicable state or local requirements.

3.12 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Prior to any renovation and/or construction activities the Contractor shall perform the following:

a. The Contractor shall conduct a Lead Based Paint Survey.

b. Lead Hazard Control. If construction activities include impact to lead containing materials, the design shall require the submission of a Lead Compliance Plan. The plan shall be job-specific that includes work procedures to be used in the disturbance of lead containing materials in accordance with 29 CFR 1926.62 and all applicable state regulations. The plan shall be submitted for Government review and approval prior to the commencement of any activities that impact lead containing materials. Whole building demolition techniques shall be used for the demolition of facilities. The design shall require the removal of lead from any portion of the existing facilities that have the potential for exposing workers or the environment to lead during the performance of construction activities.

c. Lead Waste Management. The design shall require all waste that has the potential to contain lead be transported and disposed in accordance with all applicable federal, state, and local waste regulations. Disclosure shall be made to the receiving landfill that the demolished building materials may contain lead. The design shall require a draft copy of the waste manifest be provided to the Government for approval at least (5) five working days prior to transport and disposal. The Contractor shall ensure

that all waste manifests are signed by an authorized VA signatory. The Contractor shall coordinate with the VA to ensure that an authorized representative is available to sign on the date and time that pick-up by a permitted waste transporter is scheduled.

d. Phasing. The facilities included in this SOW may be occupied during the LBP abatement. The Contractor shall determine the need for phasing of the LBP removal. If phasing is needed, the Contractor shall coordinate with the Government on phasing of the LBP removal so portions of the facility may be vacated as required to meet Federal regulations concerning prevention of lead exposure.

e. Test Reports. The Contractor shall submit the results of all lead samples

3.13 CONTROL AND MANAGEMENT OF POLYCHLORINATED BIPHENYLS (PCBS)

Manage and dispose of PCB-contaminated waste in accordance with 40 CFR 761.

3.14 CONTROL AND MANAGEMENT OF LIGHTING BALLAST AND LAMPS CONTAINING PCBS

Manage and dispose of contaminated waste in accordance with 40 CFR 761.

3.15 MILITARY MUNITIONS

In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, immediately stop work in that area and immediately inform the Contracting Officer.

3.16 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided. Storage of fuel on the project site must be in accordance with EPA, state, and local laws and regulations and paragraph OIL STORAGE INCLUDING FUEL TANKS.

3.16.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.16.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 1320 gallons will be used onsite (only containers with a capacity of 55 gallons or greater are counted), provide and implement a SPCC plan meeting the requirements of 40 CFR 112. Do not bring underground storage tanks to the VA for Contractor use during a project. Submit the SPCC plan to the Contracting Officer for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.17 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer. Do not disturb this material until authorized by the Contracting Officer.

3.18 SOUND INTRUSION

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives are not permitted without written permission from the Contracting Officer, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of New Mexico rules.

3.19 POST CONSTRUCTION CLEANUP

Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform with surrounding contours.

-- End of Section --

SECTION 01 58 00

PROJECT IDENTIFICATION
08/19, CHG 5: 08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 310-1-6a	(2006; 2019 Change 2) Project Operation -- Sign Standards Manual, VOL 1
EP 310-1-6b	(2006) Sign Standards Manual, VOL 2, Appendices

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary One Line Drawings Of Project Rendering; G

Sign Legend Orders; G

SD-04 Samples

Final Rendering Sample; G

Final Framed Rendering and Copies; G

1.3 QUALITY CONTROL

1.3.1 Rendering

Provide the project rendering in accordance with the following drawing stages as required in the SUBMITTALS paragraph. The following submittal data is required to properly identify the appropriate view and approve the final rendering of the facility. The final painted rendering will be used to produce the image for the signboard and framed photographic copies provided to the Contracting Officer.

1.3.1.1 Preliminary One Line Drawings

Provide three different views of the facility in a preliminary single line drawing (black and white) format. These three views will represent the best angles at which to view the proposed facility showing the best design

features and the three dimensional character of the facility.

1.3.1.2 Final Rendering Sample

Provide a photographic copy (8 by 10 inches minimum size) of final rendering for approval of color, landscaping, and foreground/background development prior to final submittal.

1.3.1.3 Final Framed Rendering and Copies

Provide final full color rendering of the proposed facility as specified.

1.4 PROJECT IDENTIFICATION SIGN

1.4.1 Construction Project Signs

Furnish the construction project sign package, maintain the signs during construction, and remove the signs from the job site upon completion of the project. The construction project sign package consists of two signs: one for project identification and the other to show the on-the-job safety performance of the contractor. Ensure that the package conforms to the requirements of EP 310-1-6a and EP 310-1-6b, specifically Section 16. Submit the sign legend orders as described in Section 16 of EP 310-1-6a before erecting the signs.

Utilize the Example Graphic of Signage with Dimensions for MILCON Project and follow USACE policy provided in Engineering Pamphlet (EP) 310-1-6a, Sign Standards Manual, VOL 1 for guidelines on fabricating, locating, and mounting construction project signs (https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/EP_310-1-6a%20change%202.pdf).

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 273	Standards for Universal Waste Management
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Co-mingle

The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.2.2 Construction Waste

Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.2.3 Demolition Debris/Waste

Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of Intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.2.4 Disposal

Depositing waste in a solid waste disposal facility, usually a managed landfill or incinerator, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.2.5 Diversion

The practice of diverting waste from disposal in a landfill or incinerator, by means of eliminating or minimizing waste, or reuse of materials.

1.2.6 Final Construction Waste Diversion Report

A written assertion by a material recovery facility operator identifying constituent materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.2.7 Recycling

The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.2.8 Reuse

The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.2.9 Salvage

Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.2.10 Source Separation

The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.3 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)

Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from the landfill or incinerator. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste. (1) Practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

1.4 CONSTRUCTION WASTE MANAGEMENT

Implement a Construction Waste Management Program for the project. Take a pro-active, responsible role in the management of construction waste, recycling process, disposal of demolition debris/waste, and require all subcontractors, vendors, and suppliers to participate in the Construction Waste Management Program. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.4.1 Implementation of Construction Waste Management Program

Develop and document how the Construction Waste Management Program will be implemented in a Construction Waste Management Plan. Submit a Construction Waste Management Plan to the Contracting Officer for approval. Construction waste and demolition debris/waste materials include un-used construction materials not incorporated in the final work, as well as demolition debris/waste materials from demolition activities or

deconstruction activities. In the management of waste, consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

1.4.2 Oversight

The Environmental Manager, as specified in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.4.3 Special Programs

Implement special programs involving rebates or similar incentives related to recycling of construction waste and demolition debris/waste materials. Retain revenue or savings from salvaged or recycling, unless otherwise directed. Ensure firms and facilities used for recycling, reuse, and disposal are permitted for the intended use to the extent required by federal, state, and local regulations.

1.4.4 Special Instructions

Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Designation of single source separating or commingling will be clearly marked on the containers.

1.4.5 Waste Streams

Delineate waste streams and characterization, including estimated material types and quantities of waste, in the Construction Waste Management Plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste steams not listed:

a. Land Clearing Debris

b. Asphalt

c. Masonry and CMU

d. Concrete

e. Metals (Includes, but is not limited to, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze.)

f. Wood (nails and staples allowed)

g. Glass

h. Paper

i. Plastics (PET, HDPE,PVC,LDPE,PP,PS, Other)

j. Gypsum

k. Non-hazardous paint and paint cans

l. Carpet

m. Ceiling Tiles

n. Insulation

o. Beverage Containers

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Waste Management Plan; G, ECGE

SD-06 Test Reports

Quarterly Reports

Annual Report

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; S

1.6 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Construction Waste Management Plan and to develop a mutual understanding relative to the management of the Construction Waste Management Program and how waste diversion requirements will be met.

At a minimum, discuss and document waste management goals at following meetings:

a. Preconstruction meeting.

b. Regular site meetings.

c. Work safety meeting (if applicable).

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

Submit Construction Waste Management Plan within 15 calendar days after notice to proceed. Revise and resubmit Construction Waste Management Plan as necessary, in order for construction to begin. Submit Construction Waste Management Plan not less than 60 calendar days before scheduled final site or building design approval. Revise and resubmit Construction Waste Management Plan until it receives final approval from the Contracting Officer, in order for construction to begin. Execute

demolition or deconstruction activities in accordance with Section 02 41 00 DEMOLITION. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

An approved Construction Waste Management Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Ensure all subcontractors receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement. Also, include the following in the plan:

a. Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project.

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials.

e. Name of landfill and incinerator to be used.

f. Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.

g. List of specific materials, by type and quantity, that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, address, and phone number.

h. Identification of materials that cannot be recycled or reused with an explanation or justification, to be approved by the Contracting Officer.

i. Description of the means by which materials identified in item (g) above will be protected from contamination.

j. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

k. Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.

l. Identification of at least 5 construction or demolition material streams for diversion.

m. Detailed plan and distribution of waste diversion between buildings, when project is a part of a campus.

n. Facilities or subcontractors offering construction waste transport on-site or off-site must ensure that proper shipping orders, bill of lading, manifests, or other shipping documents containing waste diversion information meet requirements of 40 CFR 273 Universal Waste Management, 49 CFR 173 Shippers - General Requirements for Shipments and Packagings, and 49 CFR 178 Specifications for Packaging. Individuals signing manifests or other shipping documents should meet the minimum training requirements.

o. List each supplier who deliver construction materials, in bulk, or package products in returnable containers or returnable packaging, or have take-back programs. List each program and the applicable material to actively monitor and track to assist in meeting waste diversion requirements on the project.

p. Identify local jurisdiction requirements for waste management. Include local requirements and points of contact.

Distribute copies of the waste management plan to each subcontractor, Quality Control Manager Environmental Manager, and the Contracting Officer.

1.8 RECORDS (DOCUMENTATION)

1.8.1 General

Maintain records to document the types and quantities of waste generated and diverted though re-use, recycling and sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.8.2 Accumulated

Maintain a running record of materials generated and diverted from landfill disposal, including accumulated diversion rates for the project. Make records available to the Contracting Officer during construction or incidental demolition activities. Provide a copy of the diversion records to the Contracting Officer upon completion of the construction, incidental demolitions or minor deconstruction activities.

1.9 REPORTS

1.9.1 General

Maintain current construction waste diversion information on site for periodic inspection by the Contracting Officer. Include in the quarterly reports, annual reports and final reports: the project name, contract information, information for waste generated, diverted and disposed of for the current reporting period and show cumulative totals for the project. Reports must identify quantifies of waste by type and disposal method. Also include in each report, supporting documentation to include manifests, weigh tickets, receipts, and invoices specifically identifying the project and waste material type and weighted sum.

1.9.2 Quarterly Reporting

Provide cumulative reports at the end of each quarter (December, March, June, and September, corresponding with the federal fiscal year for reporting purposes). Submit quarterly reports not later than 15 calendar days after the preceding quarter has ended.

1.9.3 Annual Reporting

Provide a cumulative construction waste diversion report annually. Submit annual report not later than 30 calendar days after the preceding fourth quarter has ended.

1.10 FINAL CONSTRUCTION WASTE DIVERSION REPORT

A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report 60 days prior to the Beneficial Occupancy Date (BOD).

1.11 COLLECTION

Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

Train subcontractors and other service providers to either separate waste streams or use the co-mingling method as described in the Construction Waste Management Plan. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. Separate materials by one of the following methods described herein:

1.11.1 Source Separation Method

Separate waste products and materials that are recyclable from trash and sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the Construction Waste Management Plan.

1.11.2 Other Methods

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.12 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the

following:

1.12.1 Reuse

Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved Construction Waste Management Plan. Coordinate with the Contracting Officer to identify onsite reuse opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials is not allowed on the VA project site. Consider the use of surplus industrial supply broker services, who match entities with reusable or repurpose industrial materials with entities with need of such materials.

1.12.2 Recycle

Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the Contracting Officer. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

1.12.3 Waste

Dispose by landfill or incineration only those waste materials with no practical use, economic benefit, or recycling opportunity.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS
05/19, CHG 1: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-2909	(2012) Engineering and Design -- Geospatial Data and Systems
ERDC/ITL TR-19-6	(2019) A/E/C Graphics Standard, Release 2.1
ERDC/ITL TR-19-7	(2019) A/E/C CAD Standard - Release 6.1

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are the marked-up drawings, maintained by the Contractor on-site, that depict actual conditions and deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to submitted Requests for Information (RFI's); direction from the Contracting Officer; design that is the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site and red-lined PDF files. These files serve as the basis for the creation of the record drawings.

1.2.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

1.2.3 Record Model

A model reflecting approved changes during construction including red-lines, requests for information (RFI's), and contract modifications. Include updated construction phase facility/site data for components.

1.2.4 Advanced Modeling

A subset of geospatial technologies as defined in EM 1110-1-2909 to include Building Information Modeling (BIM), Civil Information Modeling (CIM), Geographic Information Systems (GIS), and Computer-Aided Design (CAD). Advanced modeling is comprised of models and drawings that form a digital representation of the project, or part thereof, that are comprised of model elements with facility data.

1.2.5 USACE CAD/BIM Technology Center

The USACE CAD/BIM Technology Center hosts all standard content for USACE. This content can be accessed through the CAD/BIM Technology Center website, https://cadbimcenter.erdc.dren.mil/.

1.3 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for Record Drawing preparation, after award and at least 30 days prior to required use.

1.3.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction drawings and data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.4 RECORD DRAWINGS

The Government will provide pdf and or program files at the preconstruction conference that contains one set of "as-designed" electronic CAD files in the specified software and format revised to reflect all amendments and the final contract PDF drawings. The CAD files are provided to enable preparation of as-built or as-constructed drawings. If discrepancies exist between the CAD files and the contract PDF drawings, correct the CAD files to show the contract PDF drawings.

1.4.1 Variation with Contract Drawings

The electronic files provided are not part of the contract documents. If there is any discrepancy between the electronic files and the contract

drawings, the contract drawings govern. The Government has no responsibility to modify any GFM due to changes in the design that occur after award.

Evaluate the content and quality of the GFM upon receipt. If major discrepancies or omissions occur in the GFM, notify the Contracting Officer and indicate the nature of such variations.

1.4.2 Data Loss, Corruption, and Error

Transfer of GFM files may result in corrupted files resulting in data loss and errors. Use of GFM files at own risk. Verify data integrity upon receipt and request a replacement if necessary. Make any adjustment in file structure, format, or software version as needed to make GFM compatible with computer systems and/or software to meet the requirements of the contract.

1.4.3 Modeling Completeness and Quality

The Government makes no guarantee that the GFM provide the level of completeness or quality as required by the contract. Further, the Government makes no guarantee that identified variations will be corrected upon notification.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan

Warranty Tags

Spare Parts Data

SD-08 Manufacturer's Instructions

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

Record Drawings; G

Record Model; G

As-Built Record of Equipment and Materials

Final Approved Shop Drawings; G

Construction Contract Specifications; G

Certification of EPA Designated Items; G

Certification Of USDA Designated Items; G

High Performance and Sustainable Building (HPSB) Checklist; G

1.6 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

a. Indicate manufacturer's name, part number, and stock level required for test and balance, pre-commissioning, maintenance and repair activities. List those items that may be standard to the normal maintenance of the system.

b. At acceptance of commissioning, ensure the required stock level is supplied as indicated in subparagraph a for maintenance and repair activities through the facilities warranty period. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.7 QUALITY CONTROL

Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols.

1.8 WARRANTY MANAGEMENT

1.8.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan narrative must contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Submit warranty information, made available during the construction phase, to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period must begin on the date of project acceptance and continue for the full product warranty period. Conduct a joint 4 month and 9 month warranty inspection, measured from time of acceptance; with the Contractor, Contracting Officer and the Customer Representative. The warranty management plan must include, but is not limited to, the following:

a. Roles and responsibilities of personnel associated with the warranty process, including points of contact and telephone numbers within the

organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

b. For each warranty, the name, address, telephone number, and e-mail of each of the guarantor's representatives nearest to the project location.

c. A list and status of delivery of Certificates of Warranty for extended warranty items, including roofs, HVAC balancing, pumps, motors, transformers, and for commissioned systems, such as fire protection and alarm systems, sprinkler systems, and lightning protection systems.

d. As-Built Record of Equipment and Materials list for each warranted equipment, item, feature of construction or system indicating:

(1) Name of item.
(2) Model and serial numbers.
(3) Location where installed.
(4) Name and phone numbers of manufacturers or suppliers.
(5) Names, addresses and telephone numbers of sources of spare parts.
(6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have warranties longer than one year must be indicated with separate warranty expiration dates.
(7) Cross-reference to warranty certificates as applicable.
(8) Starting point and duration of warranty period.
(9) Summary of maintenance procedures required to continue the warranty in force.
(10) Cross-reference to specific pertinent Operation and Maintenance manuals.
(11) Organization, names and phone numbers of persons to call for warranty service.
(12) Typical response time and repair time expected for various warranted equipment.

e. The plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

f. Procedure and status of tagging of equipment covered by warranties longer than one year.

g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty or safety reasons.

1.8.2 Performance Bond

The Performance Bond must remain effective throughout the construction and warranty period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to

recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.8.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. At this meeting, establish and review communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact must be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.8.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Life Safety Systems
(1) Fire suppression systems.
(2) Fire alarm system(s) in place in the building.

Code 1-Air Conditioning Systems
(1) Recreational support.
(2) Air conditioning leak in part of building, if causing damage.

(3) Air conditioning system not cooling properly.

Code 1-Doors
(1) Overhead doors not operational, causing a security, fire, or safety problem.
(2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors
(1) Overhead doors not operational.
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical
(1) Power failure (entire area or any building operational after 1600 hours).
(2) Security lights
(3) Smoke detectors

Code 2-Electrical
(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights (in a room or part of building).

Code 3-Electrical
Street lights.

Code 1-Gas
(1) Leaks and breaks.
(2) No gas to family housing unit or cantonment area.

Code 1-Heat
(1) Area power failure affecting heat.
(2) Heater in unit not working.

Code 2-Kitchen Equipment
(1) Dishwasher not operating properly.
(2) All other equipment hampering preparation of a meal.

Code 1-Plumbing
(1) Hot water heater failure.
(2) Leaking water supply pipes.

Code 2-Plumbing
(1) Flush valves not operating properly.
(2) Fixture drain, supply line to commode, or any water pipe leaking.
(3) Commode leaking at base.

Code 3 -Plumbing
Leaky faucets.

Code 3-Interior
(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks
Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks
Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 2-Water (Exterior)
No water to facility.

Code 2-Water (Hot)
No hot water in portion of building listed.

Code 3-All other work not listed above.

1.8.5 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	

WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

Prepare the CAD drawing files in MicroStation V8 format compatible with a Windows 10 operating system.

2.1.1 Additional Drawings

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings.

2.1.1.1 Sheet Numbers and File Names

If a sheet needs to be added between two sequential sheets, append a Supplemental Drawing Designator in accordance with ERDC/ITL TR-19-7 Adding a drawing sheet, and ERDC/ITL TR-19-6 Adding or deleting drawing sheets and index sheet procedures.

2.2 ADVANCED MODELING PACKAGE

For each Advanced Modeling Package submittal for both the Interim Record Model Package and the Final Record Model Package, submit in accordance with ERDC/ITL TR-19-7 and also provide the following items:

a. Advanced Modeling PxP: Provide an electronic copy of the most current approved version of the project Advanced Modeling PxP.

b. Electronic Files: Provide an electronic list (.txt file or similar), of all submitted electronic files including a description, directory, and file name for each file submitted. Identify which files have been produced from the Model and Facility Data. For all sheet files, include a list of the sheet titles and sheet numbers.

c. Advanced Modeling Submittal Checklist: Complete the USACE BIM/CIM Advanced Modeling Submittal Checklist and include with each submittal. Download the Checklist from the USACE CAD/BIM Technology Center website.

d. Advanced Modeling Files: Provide all native Advanced Modeling files associated with the production of the contract drawings and associated as-modeled drawings. Update and maintain in compliance with the Advanced Modeling formatting, content requirement, and standards in , in order to yield a complete and coordinated document package.

e. Quality Control (QC) Reports: Provide electronic PDFs of all QC reports and checklist utilized to ensure full compliance with the contract requirements and standards.

2.3 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items and FAR 52-223-17 Affirmative Procurement of EPA designated items in Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

a. The product does not meet appropriate performance standards;

b. The product is not available within a reasonable time frame;

c. The product is not available competitively (from two or more sources);

d. The product is only available at an unreasonable price (compared with a comparable non-recycled content product).

Record each product used in the project that has a requirement or option of containing recycled content in accordance with all state, local, and federal laws, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, exemptions (a, b, c, or d, as indicated), and comments. Recycled content values may be determined by weight or volume percent, but must be consistent throughout.

2.4 CERTIFICATION OF USDA DESIGNATED ITEMS

Submit the Certification of USDA Designated Items as required by FAR 52-223-1 Bio-based Product Certifications and FAR 52.223-2 Affirmative Procurement of Biobased Products Under Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current USDA standards for biobased materials content. The following exemptions may apply to the non-procurement of biobased content materials:

a. The product does not meet appropriate performance standards;

b. The product is not available within a reasonable time frame;

c. The product is not available competitively (from two or more sources);

d. The product is only available at an unreasonable price (compared with a comparable bio-based content product).

Record each product used in the project that has a requirement or option of containing biobased content in accordance with all state, local, and federal laws, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, total value of biobased content, exemptions (a, b, c, or d, as indicated), and comments.

Biobased content values may be determined by weight or volume percent, but must be consistent throughout.

2.5 PDF AS-BUILT FILES

Provide electronic PDF "plots" of all contract drawings sheets associated with the as-built drawing submittal. Compile and organize the PDF set to match the contract drawings. Bookmark and label the pages of the PDF file.

2.6 REDLINES AND MARKUPS

Provide PDFs of the current working redlines and/or markups complying with the as-builts drawing and markup requirements contained in this specification.

2.7 GEO-DATA-BASE FILES

Provide a SDSFIE/FGDC GeoReferenced personal GeoDataBase. For all information outside of the building walls, provide a personal GeoDataBase in .mdb format using the latest version of Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) as the database structure. Provide a shell database to define the projection and database structure.

For all drawings within and including the exterior walls, utilize the advanced modeling formats described and referenced herein. Provide a short GeoDataBase read-me file explaining the deliverable. The read-me file will include a description of the software used to create the data, projection, and include the attribute tables used.

2.8 AS-BUILT OR ADVANCED MODELING RE-SUBMISSION REQUIREMENTS

If elements of an as-built submittal or advanced modeling package are rejected, provide the following for each re-submission, in addition to any information required in Section 01 33 00 SUBMITTAL PROCEDURES:

a. Re-submit all components required under paragraph As-Builts or Advanced Modeling Package, including a new Advanced Modeling Submittal Checklist and updated content in response to Government comments.

b. Provide a copy of all Government review comments.

c. Provide a disposition/response to each Government review comment for a back-check of the re-submission deliverable.

PART 3 EXECUTION

3.1 AS-BUILT DRAWINGS

Provide and maintain two black line print copies of the PDF contract drawings for As-Built Drawings. Maintain the as-builts throughout construction as red-lined hard copies on site and red-lined PDF files. Submit As-Built Drawings 30 days prior to Beneficial Occupancy Date (BOD).

3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where item(s) were relocated

and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use base colors of red, green, and blue. Color code for changes as follows:

(1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

(2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

1) Add an entire drawing to contract drawings

2) Change the contract drawing to show changes on the drawing.

3) Provided for reference only to further detail the initial design.

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 As-Built Drawings Content

Revise As-Built Drawings and red-lined PDF files in accordance with ERDC/ITL TR-19-6 and ERDC/ITL TR-19-7. Keep these working as-built markup drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract drawings which are made during construction or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Submit the working as-built markup

drawings for approval prior to submission of each monthly pay estimate. For failure to maintain the working and final record drawings as specified herein, the Contracting Officer will withhold 10 percent of the monthly progress payment until approval of updated drawings. Show on the as-built drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and dimensions of any changes within the building structure.

c. Layout and schematic drawings of electrical circuits and piping.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

e. Changes in details of design or additional information obtained from working drawings specified to be prepared or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment, and foundations.

f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

g. Changes or Revisions which result from the final inspection.

h. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.

i. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.

j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

k. Changes in location of equipment and architectural features.

l. Modifications.

m. Actual location of anchors, construction and control joints, etc., in concrete.

n. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

o. Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.

3.2 RECORD DRAWING FILES

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CAD files. Provide all program files and hardware necessary to prepare final PDF record drawings. The Contracting Officer will review final PDF record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

3.2.1 Rename the CAD Drawing files

Rename the CAD Drawing files using the contract number as the Project Code field,(e.g., W91238-15-C-10A-102.DGN) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. Make all changes on the layer/level as the original item.

a. For MicroStation files (DGN), enter all as-built delta changes and notations on:

- Level #63
- Level/Layer Name contains: ANNO-REVS
- Level/Layer Description: Revisions

b. When final revisions have been completed, show the wording "RECORD DRAWING AS-BUILTS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Date RECORD DRAWING AS-BUILTS" drawing revisions in the revision block.

c. Within 20 days after Government approval of all of the working record drawings for a phase of work, prepare the final CAD record drawings for that phase of work and submit PDF drawing files and two sets of prints for review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days revise the CAD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit one set of electronic CAD files, and one set of the approved working record PDF and or program files with two sets of prints. The CAD files must be complete in all details and identical in form and function to the CAD drawing files supplied by the Government. Prepare MicroStation files for transmittal using the Packager (Archive). Make any transactions or adjustments necessary to accomplish this. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CAD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record PDF drawing files, CAD files and marked prints as specified will be cause for withholding any payment due under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made.

3.3 RECORD DRAWINGS

Prepare final record drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (such as Foundations, Utilities, or Structural Steel as appropriate for the project). Transfer the changes from the approved working as-built markup drawings to the original electronic CAD drawing files. Modify the as-built CAD drawing files to correctly show the features of the project as-built by bringing the working CAD drawing set into agreement with approved working as-built markup drawings, and adding such additional drawings as may be necessary. Refer to ERDC/ITL TR-19-6. Jointly review the working as-built markup drawings with printouts from working as-built CAD drawing PDF files for accuracy and completeness. Monthly review of working as-built CAD drawing PDF file printouts must cover all sheets revised since the previous review. These PDF drawing files are part of the permanent records of this project. Any drawings damaged or lost must be satisfactorily replaced at no expense to the Government.

Drawing revisions (include within change order price the cost to change working and final record drawings to reflect revisions) and compliance with the following procedures.

a. Follow directions in the revision for posting descriptive changes.

b. The revision delta size must be 5/16 inch unless the area where the delta is to be placed is crowded. Use a smaller size delta for crowded areas.

c. Place a revision delta at the location of each deletion.

d. For new details or sections which are added to a drawing, place a revision delta by the detail or section title.

e. For minor changes, place a revision delta by the area changed on the drawing (each location).

f. For major changes to a drawing, place a revision delta by the title of the affected plan, section, or detail at each location.

g. For changes to schedules or drawings, place a revision delta either by the schedule heading or by the change in the schedule.

3.3.1 Final Record Drawing Package

Submit the final record PDF and CAD drawings package for the entire project within 20 days of substantial completion of all phases of work. Submit one set of ANSI D size PDF and CAD files, two sets of ANSI D size prints and one set of the approved working record drawings. The package must be complete in all details and identical in form and function to the contract drawing files supplied by the Government.

3.4 FINAL APPROVED SHOP DRAWINGS

Submit final approved project shop drawings 30 days after transfer of the completed facility.

3.5 CONSTRUCTION CONTRACT SPECIFICATIONS

Submit final PDF file record construction contract specifications,

including revisions thereto, 30 days after transfer of the completed facility.

3.6 AS-BUILT RECORD OF EQUIPMENT AND MATERIALS

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 15 days after final inspection with Government comments. Submit two sets of final record of equipment and materials 30 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

3.7 CLEANUP

Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

-- End of Section --

SECTION 02 82 00

ASBESTOS REMEDIATION
11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2	(2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM C732	(2006; R 2012) Aging Effects of Artificial Weathering on Latex Sealants
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D2794	(1993; R 2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D4397	(2016) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E84	(2018a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2016) Standard Test Methods for Water Vapor Transmission of Materials
ASTM E119	(2018c; E 2018) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E736/E736M	(2017) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E1368	(2014) Visual Inspection of Asbestos Abatement Projects

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(2014) Compressed Air for Human Respiration; 6th Edition

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2015) Occupational and Educational Personal Eye and Face Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2019) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM	(2016; 5th Ed) NIOSH Manual of Analytical Methods

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1926.51	Sanitation
29 CFR 1926.59	Hazard Communication
29 CFR 1926.103	Respiratory Protection
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.1101	Asbestos
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special

	Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Dec 2017) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 ACM

Asbestos Containing Materials.

1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

1.2.3 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.2.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.2.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

1.2.8 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.2.9 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.2.10 Competent Person (CP)

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person must have a current asbestos contractors or supervisors license.

1.2.11 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

1.2.12 Disposal Bag

A 6-mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.2.13 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

1.2.14 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

1.2.15 Encapsulants

Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

a. Removal Encapsulant (can be used as a wetting agent)

b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)

c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)

d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

1.2.16 Friable Asbestos Material

A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

1.2.17 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

1.2.18 Government Consultant (GC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The GC is normally a private consultant, but can be an employee of the Government.

1.2.19 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.2.20 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

1.2.21 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

1.2.22 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M.

1.2.23 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.2.24 Permissible Exposure Limits (PELs)

1.2.24.1 PEL-Time Weighted Average(TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).

1.2.24.2 PEL-Excursion Limit

An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

1.2.25 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.2.26 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.2.27 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E1368. The QP must be appropriately licensed in the State of New Mexico.

1.2.28 TEM

Refers to Transmission Electron Microscopy.

1.2.29 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.30 Transite

A generic name for asbestos cement wallboard and pipe.

1.2.31 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

1.2.32 Worker

Individual (not designated as the Competent Person or a supervisor) who

performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed. The worker must be appropriately licensed.

1.3 REQUIREMENTS

1.3.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures must be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the demolition and removal of asbestos-containing materials located in Building 22000, and governed by 40 CFR 763. Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein. Provide negative pressure enclosure techniques as outlined in this specification. The buildings will be evacuated during the asbestos abatement work. A competent person must supervise asbestos removal work as specified herein.

1.3.2 Unexpected Discovery of Asbestos

Notify the Contracting Officer if any previously untested building components suspected to contain asbestos are impacted by the work.

1.3.3 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.3.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.3.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health

(OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.4 Employee Training

Submit certificates, prior to the start of work but after the main abatement submittal, signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis. Organize certificates by individual worker, not grouped by type of certification. Post appropriate evidence of compliance with the training requirements of 40 CFR 763. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101 and 29 CFR 1926.103. Fully cover engineering and other hazard control techniques and procedures. Asbestos workers must have a current asbestos worker's license.

1.3.5 Permits, Licenses, and Notifications

Prior to the start of work, obtain necessary permits and licenses in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities. Notify the New Mexico Environment Department and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M. Notify the Contracting Officer and other appropriate Government agencies in writing 20 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. Submit copies of all Notifications to the Contracting Officer.

1.3.6 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of EM 385-1-1, 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, and 40 CFR 763. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government apply.

1.3.7 Respiratory Protection Program

Establish and implement a respirator program as required by 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of

the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.3.7.1 Respirator Program Records

Submit records of the respirator program as required by 29 CFR 1926.103, and 29 CFR 1926.1101.

1.3.7.2 Respirator Fit Testing

The Contractor's PQP must conduct a qualitative or quantitative fit test conforming to 29 CFR 1926.103 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test must be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that will affect the fit, a new fit test must be performed. Functional fit checks must be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.3.7.3 Respirator Selection and Use Requirements

Provide respirators and ensure that they are used as required by 29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators must be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. For air-purifying respirators, the particulate filter must be high-efficiency particulate air (HEPA)/(N-,R-,P-100). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type must be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

1.3.8 Asbestos Hazard Control Supervisor

The Contractor must be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.3.9 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

1.3.10 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, safety data sheets (SDSs) of any chemicals planned on being used (such as, spray adhesives, chemical strippers, or encapsulants), and confined space entry procedures and equipment and work procedures to be used in the removal and demolition of materials containing asbestos. The plan, not to be combined with other hazard abatement plans, must be prepared, signed, and sealed by the PQP. Provide a Table of Contents for each abatement submittal, which follows the sequence of requirements in the contract. The plan must include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body

protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, encapsulation method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan must also include (both fire and medical emergency) response plans and an Activity Hazard Analyses (AHAs) in accordance with EM 385-1-1. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, CP and PQP must meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan must be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.3.11 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.3.12 Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by the U.S. Environmental Protection Agency, Region 6, New Mexico Environment Department's Air Quality Bureau, and local regulatory agencies. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within one day of the shipment leaving the project site.

1.3.13 Transporter Certification

Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172 and 49 CFR 173 as well as registration requirements of 49 CFR 107 and all other State and local regulatory agency requirements.

1.3.14 Medical Certification

Provide a written certification for each worker and supervisor, signed by

a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Amended Water; G

Safety Data Sheets (SDS) for All Materials; G

Encapsulants; G

Respirators; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Vacuums; G

SD-06 Test Reports

Air Sampling Results; G

Pressure Differential Recordings for Local Exhaust System; G

Clearance Sampling; G

Asbestos Disposal Quantity Report; G

SD-07 Certificates

Employee Training; G

Notifications; G

Respiratory Protection Program; G

Asbestos Hazard Abatement Plan; G

Testing Laboratory; G

Landfill Approval; G

Delivery Tickets; G

Waste Shipment Records; G

Transporter Certification; G

Medical Certification; G

Private Qualified Person Documentation; G

Competent Person; G

Worker's License; G

Contractor's License; G

Federal, State or Local Citations on Previous Projects; G

Encapsulants; G

Equipment Used to Contain Airborne Asbestos Fibers; G

Water Filtration Equipment; G

Vacuums; G

Ventilation Systems; G

SD-11 Closeout Submittals

Permits and Licenses; G

Notifications; G

Respirator Program Records; G

Rental Equipment; G

1.5 QUALITY ASSURANCE

1.5.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP must be appropriately licensed as a Project Monitor. The PQP and the asbestos contractor must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP must be a first-tier subcontractor.

1.5.2 Competent Person Documentation

The Competent Person must be experienced in the administration and supervision of asbestos abatement projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, and notification of

other employees onsite. The Competent Person must be on-site at all times when asbestos abatement activities are underway. Submit training certification and a current Asbestos Contractor's and Supervisor's License. Submit evidence that the Competent Person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements.

1.5.3 Worker's License

Submit documentation that workers meet the requirements of 29 CFR 1926.1101, 40 CFR 61-SUBPART M and have a current Asbestos Workers License.

1.5.4 Contractor's License

Submit a copy of the asbestos contractor's license issued by the State of New Mexico. Submit the following certification along with the license: "I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61-SUBPART MEM 385-1-1, and the Federal, State and local requirements for those asbestos abatement activities that they will be involved in." This certification statement must be signed by the Company's President or Chief Executive.

1.5.5 Air Sampling Results

Complete fiber counting and provide results to the PQP and GC for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within three working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PQP and GC. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance must levels exceed 0.1 fibers per cubic centimeter.

1.5.6 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PQP and GC for review and to the Contracting Officer within 24-hours from the end of each work day.

1.5.7 Federal, State or Local Citations on Previous Projects

Submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities within the last 5 years (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company must be provided.

1.5.8 Preconstruction Conference

Conduct a safety preconstruction conference to discuss the details of the Asbestos Hazard Abatement Plan, Accident Prevention Plan (APP) including the AHAs required in specification Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. The safety preconstruction conference must include the Contractor and their Designated Competent Person, Designated IH and Project Supervisor and the Contracting Officer. Deficiencies in the APP will be discussed. Onsite work must not begin until the APP has been accepted.

1.6 SECURITY

A log book must be kept documenting entry into and out of the regulated area. Entry into regulated areas must only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas must be trained, medically evaluated, and wear the required personal protective equipment.

1.7 EQUIPMENT

1.7.1 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants must conform to current USEPA requirements, contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and conform to the following performance requirements.

2.1.1 Removal Encapsulants

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test

Requirement	Test Standard
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.2 Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.3 Penetrating Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Cohesion/Adhesion Test - 50 pounds of force/foot	ASTM E119
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119

Requirement	Test Standard
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.4 Lock-down Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E119
Bond Strength: 100 pounds of force/foot	ASTM E736/E736M
(Tests compatibility with cementitious and fibrous fireproofing)	

2.2 DUCT TAPE

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.3 DISPOSAL CONTAINERS

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for ACM wastes as required by 29 CFR 1926.1101. Disposal containers can be in the form of:

a. Disposal Bags

b. Fiberboard Drums

c. Cardboard Boxes

2.4 SHEET PLASTIC

Sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must be clear, frosted, or black and conform to ASTM D4397, except as specified

below.

2.4.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets must be provided. Film must be frosted or black and must conform to the requirements of NFPA 701.

2.4.2 Reinforced

Reinforced sheets must be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock must consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film must meet flame resistant standards of NFPA 701.

2.5 MASTIC REMOVING SOLVENT

Mastic removing solvent must be nonflammable and must not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite must have a flash point greater than 140 degrees F.

2.6 LEAK-TIGHT WRAPPING

Two layers of 6 mil minimum thick polyethylene sheet stock must be used for the containment of removed asbestos-containing components or materials such as large tanks, boilers, insulated pipe segments and other materials. Upon placement of the ACM component or material, each layer must be individually leak-tight sealed with duct tape.

2.7 VIEWING INSPECTION WINDOW

Where feasible, a minimum of one clear, 1/8-inch thick, acrylic sheet, 18 by 24 inches, must be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows must be sealed leak-tight with industrial grade duct tape.

2.8 WETTING AGENTS

Removal encapsulant (a penetrating encapsulant) must be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant must be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

PART 3 EXECUTION

3.1 EQUIPMENT

Provide the Contracting Officer or the Contracting Officer's Representative, with at least two complete sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Air Monitoring Equipment

The Contractor's PQP must approve air monitoring equipment. The equipment must include, but must not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8-micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

d. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

3.1.2 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.2.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, encapsulation, removal, or demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103. Breathing air must comply with CGA G-7.

3.1.3 Exterior Whole-Body Protection

3.1.3.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort but must not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3.1.3.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the GC after each use.

3.1.3.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Wastewater filters must be installed in series with the first stage pore size 20 microns and the second stage pore size of 5 microns. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste. Keep the floor of the decontamination unit's clean room dry and clean at all times. Proper housekeeping and hygiene requirements must be maintained. Provide soap and towels for showering, washing and drying. Cloth towels provided must be disposed of as ACM waste or must be laundered in accordance with 29 CFR 1926.1101. Physically attach the decontamination units to the asbestos control area. Construct both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.3.4 Eye Protection

Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.4 Regulated Areas

All Class I, II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

3.1.5 Load-out Unit

Provide a temporary load-out unit that is adjacent and connected to the regulated area. Attach the load-out unit in a leak-tight manner to each regulated area.

3.1.6 Warning Signs and Labels

Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated

with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable

3.1.6.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

Legend	Notation
DANGER	one inch Sans Serif Gothic or Block
ASBESTOS	one inch Sans Serif Gothic or Block
MAY CAUSE CANCER	one inch Sans Serif Gothic or Block
CAUSES DAMAGE TO LUNGS	1/4 inch Sans Serif Gothic or Block
AUTHORIZED PERSONNEL ONLY	1/4 inch Sans Serif Gothic or Block
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA	1/4 inch Sans Serif Gothic or Block

Spacing between lines must be at least equal to the height of the upper of any two lines.

3.1.6.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST AVOID CREATING DUST

3.1.7 Local Exhaust System

Provide a local exhaust system in the asbestos control area in accordance with ASSP Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the asbestos control area is removed and must be leak proof to the filter and equipped with

HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

3.1.8 Tools

Vacuums must be leak proof to the filter and equipped with HEPA filters. Filters on vacuums must conform to ASSP Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse. Reusable tools must be thoroughly decontaminated prior to being removed from the regulated areas.

3.1.9 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.1.10 Single Stage Decontamination Area

A decontamination area (equipment room/area) must be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area must be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area must be covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

3.1.11 Decontamination Area Exit Procedures

Ensure that the following procedures are followed:

a. Before leaving the regulated area, remove all gross contamination and debris from work clothing using a HEPA vacuum.

b. Employees must remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal or laundering.

c. Employees must not remove their respirators until showering.

d. Employees must shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment

room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet or if given prior EPA approval, dry removal procedures and negative pressure enclosure techniques. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics is permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, and provide temporary heating, ventilation, and air conditioning prior to the commencement of asbestos work. Power to the regulated area must be locked-out and tagged in accordance with 29 CFR 1910.147. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water. All electrical work must be performed by a licensed electrician. Stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. Correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work must resume only upon notification by the Contracting Officer. Corrective actions must be documented. If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Building Ventilation System and Critical Barriers

Building ventilation system supply and return air ducts in a regulated area must be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals must consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces must be sealed with industrial grade duct tape.

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.2 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This

includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

3.2.3 Furnishings

Furniture and equipment will remain in the building. Cover and seal furnishings with 6-mil plastic sheet or remove from the work area and store in a location on site approved by the Contracting Officer.

3.2.4 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

3.2.5 Asbestos Control Area Requirements

3.2.5.1 Negative Pressure Enclosure

Removal of asbestos contaminated acoustical ceiling tiles, spray applied fireproofing, thermal system insulation, gypsum wallboard/joint compound require the use of a negative pressure enclosure. Block and seal openings in areas where release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development must include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 6-mil plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 6-mil plastic sheet over floors and extend a minimum of 12 inches up walls. Seal all joints with tape. Provide local exhaust system in asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, supply and exhaust of air for local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain efficiency of the system.

3.2.5.2 Glovebag

If the construction of a negative pressure enclosure is infeasible for the removal of ACM. Use alternate techniques as indicated in 29 CFR 1926.1101. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers and maintain all other requirements for asbestos control areas. The PQP must conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those obtained by the Contractor, the Government will determine which results predominate. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the

area as specified herein.

3.2.5.3 Regulated Area for Class II Removal

Removal of asbestos containing floor tile/mastic, carpet/mastic, and sealants are Class II removal activities. Establish designated limits for the asbestos regulated work area with the use of red barrier tape; install critical barriers, splash guards and signs, and maintain all other requirements for asbestos control area except local exhaust. Place impermeable dropcloths on surfaces beneath removal activity extending out 3 feet in all directions. A detached decontamination system may be used. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If workers the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.6 Removal Procedures

Wet asbestos material with a fine spray of amended water or a specific wetting agent such as light oil during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Containerize asbestos containing material while wet. Do not allow asbestos material to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.6.1 Sealing Contaminated Items Designated for Disposal

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant must be tinted a contrasting color and spray-applied by airless method. Thoroughness of sealing operation must be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants must comply with the performance requirements specified herein.

3.2.6.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4-inch-thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge

of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

3.2.7 Methods of Compliance

3.2.7.1 Mandated Practices

The specific abatement techniques and items identified must be detailed in the Contractor's AHAP. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters.

b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal.

d. Inspection and repair of polyethylene.

e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

3.2.7.2 Control Methods

Use the following control methods:

a. Local exhaust ventilation equipped with HEPA filter;

b. Enclosure or isolation of processes producing asbestos dust;

c. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and must supplement them by the use of respiratory protection.

3.2.7.3 Unacceptable Practices

The following work practices must not be used:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.2.8 Class I Work Procedures

In addition to requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the installation and operation of the control methods.

b. For jobs involving the removal of more than 25 feet or 10 square feet of TSI or surfacing material, place critical barriers over all openings to the regulated area.

c. HVAC systems must be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.

d. Impermeable dropcloths (6 mil or greater thickness) must be placed on surfaces beneath all removal activity.

e. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area must be ventilated with a HEPA unit and employees must use PPE.

3.2.9 Specific Control Methods for Class I Work

Use Class I work procedures, control methods and removal methods for the following ACM:

a. Spray Applied Fireproofing

b. Gypsum Wallboard and Joint Compound

c. Thermal System Insulation and Mudded Pipe Fittings

d. Plaster and Textured Ceilings and Walls

e. Vermiculite

3.2.9.1 Negative Pressure Enclosure (NPE) System

The system must provide at least four air changes per hour inside the containment. The local exhaust unit equipment must be operated 24-hours per day until the containment is removed. The NPE must be smoke tested for leaks at the beginning of each shift and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential must be monitored continuously, 24-hours per day, with an automatic manometric recording instrument and Records must be provided daily on the same day collected to the Contracting Officer. The Contracting Officer must be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system must not be used as the local exhaust system for the regulated area. The NPE must terminate outdoors unless an alternate arrangement is allowed by the Contracting Officer. All filters used must be new at the beginning of the project and must be periodically changed as necessary and disposed of as ACM waste.

3.2.9.2 Glovebag Systems

Glovebags must be used without modification, smoke-tested for leaks, and completely cover the circumference of pipe or other structures where the work is to be done. Glovebags must be used only once and must not be moved. Glovebags must not be used on surfaces that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags must be collapsed using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation must be wrapped and sealed in

2 layers of plastic or otherwise rendered intact. At least two persons must perform glovebag removal. Asbestos regulated work areas must be established for glovebag abatement. Designated boundary limits for the asbestos work must be established with rope or other continuous barriers and all other requirements for asbestos control areas must be maintained, including area signage and boundary warning tape.

a. Attach HEPA vacuum systems to the bag to prevent collapse during removal of ACM.

b. The negative pressure glove boxes must be fitted with gloved apertures and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure must be created in the system using a HEPA filtration system. The box must be smoke tested for leaks prior to each use.

3.2.9.3 Mini-Enclosure

Single bulkhead containment, double bulkhead containment or mini -containment (small walk-in enclosure) to accommodate no more than two persons, may be used if the disturbance or removal can be completely contained by the enclosure. The mini-enclosure must be inspected for leaks and smoke tested before each use. Air movement must be directed away from the employee's breathing zone within the mini-enclosure.

3.2.9.4 Wrap and Cut Operation

Prior to cutting pipe, the asbestos-containing insulation must be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps must be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

3.2.9.5 Class I Removal Method

Class I ACM must be removed using a control method described above. Prepare work area as previously specified. Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area. Spread one layer of 6-mil seamless plastic sheeting on the floor below the work area. Remove asbestos containing spray applied fireproofing using a scraper and wet methods and immediately place into 6-mil thickness disposal bag. After removal of the material use a wire brush to clean the exposed substrate to remove residual material. Continue wet cleaning until surfaces are free of visible debris. Cut manageable sections of gypsum wallboard and joint compound and immediately place into a 6-mil minimum thickness disposal bag or other approved container. Make every effort to keep the material from falling to the floor of the work area. Use a wire brush and wet clean to remove residual material from studs. Continue wet cleaning until the surface is clean of visible material and encapsulate stud walls. Remove ACM thermal system insulation and mudded pipe fittings using mechanical means and wet methods and immediately place into 6-mil thickness disposal bag. Continue wet cleaning until surfaces are free of visible debris. Remove ACM plaster ceilings or walls using mechanical means and adequately wet methods and immediately place into 6-mil thickness disposal bag. Make every effort to keep the material from falling to the floor of the work area. Continue wet cleaning until surfaces are free of visible debris. Remove ACM

textured ceiling finish using a scraper and wet methods and immediately place into 6-mil thickness disposal bag. Floors are considered contaminated from fallen textured ceiling finish. Clean up debris on floor and dispose of carpet as asbestos contaminated material. After removal of the material use a wire brush to clean the exposed concrete or ceiling to remove residual material. Continue wet cleaning until surfaces are free of visible debris. Remove ACM vermiculite using mechanical means and adequately wet methods and immediately place into 6-mil thickness disposal bag. Make every effort to keep the material from falling to the floor of the work area. Continue wet cleaning until surfaces are free of visible debris. Bag all asbestos debris which has fallen to the floor as asbestos-containing debris. Place all debris in plastic disposal bags of 6-mil minimum thickness. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers or the designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work, and immediately correct the situation.

3.2.10 Class II Work Procedures

In addition to the requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.11 Specific Control Methods for Class II Work

3.2.11.1 Vinyl and Asphaltic Flooring Materials, Carpet, and Mastic

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. A detached decontamination system may be used. When removing vinyl floor tile and mastic or carpet and mastic which contains ACM, use the following practices. Remove floor tile and mastic or carpet and mastic using adequately wet methods. Remove floor tiles or carpet and mastic intact (if possible). Do not sand flooring or its backing. Scrape residual adhesive and backing using wet methods. Mechanical chipping is prohibited unless performed in a negative pressure enclosure. Dry sweeping is prohibited. Use vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) to clean floors. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to

achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If workers the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.11.2 Sealants and Mastic

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers and signs, and maintain all other requirements for asbestos control area except local exhaust. Spread 6-mil plastic sheeting on ground around perimeter of the work area extending out in all directions. Using adequately wet methods, carefully remove ACM sealants and mastics using a scraper of knife blade. As it is removed place material into a disposal bag. Make every effort to keep asbestos material from falling to the ground or work area floor below. Dry sweeping is prohibited. Use vacuums equipped with HEPA filter and disposable dust bag. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If airborne fiber concentration of the workers or at designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.11.3 Suspect Fire Doors

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. A detached decontamination system may be used. Spread 6-mil plastic sheeting on the ground beneath the work area and around the perimeter of the work area extending out in all directions. Remove door intact from hinges and wrap with 6-mil plastic sheeting. Inspect the interior areas of the door to determine if ACM is present. If ACM is not present the door may be disposed of as general construction debris. If ACM is present place whole door in enclosed container for disposal. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.11.4 Roofing Materials

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. When removing roofing materials which contain ACM as described in 29 CFR 1926.1101(g)(8)(ii), use the following practices. Roofing material must be removed in an intact state. Wet methods must be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. When removing built-up roofs, with asbestos-containing roofing felts and an aggregate surface, using a power roof cutter, all dust resulting from the cutting operations must be collected by a HEPA dust collector, or must be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material must not be dropped or thrown to the ground, but must be lowered to the ground via covered, dust-tight chute, crane, hoist or other method approved by the Contracting Officer. Any ACM that is not intact must be lowered to the ground as soon as practicable, but not later than the end of the work shift. While the material remains on the roof it must be kept wet or placed in an impermeable waste bag or wrapped in plastic sheeting. Intact ACM must be lowered to the ground as soon as practicable, but not later than the end of the work shift. Unwrapped material must be transferred to a closed receptacle. Critical barriers must be placed over roof level heating and ventilation air intakes. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.11.5 Cementitious Siding and Shingles or Transite Panels

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. When removing cementitious asbestos-containing siding, shingles or Transite panels use the following work practices. Intentionally cutting, abrading or breaking is prohibited. Each panel or shingle must be sprayed with amended water prior to removal. Nails must be cut with flat, sharp instruments. Unwrapped or unbagged panels or shingles must be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.11.6 Gaskets

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. Gaskets must be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal must be undertaken within a glovebag. Any scraping to remove residue must be performed wet. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.12 Abatement of Asbestos Contaminated Soil

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. Asbestos contaminated soil must be removed from areas to a minimum depth of 2 inches. Soil must be thoroughly dampened with amended water and then removed by manual shoveling into labeled containers. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck-tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.13 Air Sampling

Perform sampling of airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 must be performed by the PQP. Sampling performed for environmental and quality control reasons must be performed by the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate. Results of breathing zone samples must be posted at the job site and made available to the Contracting Officer. Submit all documentation regarding

initial exposure assessments, negative exposure assessments, and air-monitoring results.

3.2.13.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each demolition or removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.13.2 Sampling During Asbestos Work

The PQP must provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed and results provided within 24-hours (breathing zone samples), and 8 hours (environmental/clearance monitoring) after completion of a sampling period. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels. The written results must be signed by testing laboratory analyst, testing laboratory principal and the Contractor's PQP. The air sampling results must be documented on a Contractor's daily air monitoring log.

3.2.13.3 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using NIOSH NMAM Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, must be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, the asbestos fiber concentration (asbestos f/cc) must be confirmed from that same filter using NIOSH NMAM Method 7402 (TEM) at Contractor's expense. If any confirmation sample result is greater than 0.01 asbestos f/cc, abatement is incomplete and cleaning must be repeated at the Contractor's expense. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at the Contractor's expense.

3.2.13.4 Final Clearance Requirements, EPA TEM Method

For EPA TEM sampling and analysis, using the EPA Method specified in 40 CFR 763, abatement inside the regulated area is considered complete when the arithmetic mean asbestos concentration of the five inside samples is less than or equal to 70 structures per square millimeter (70 S/mm). When the arithmetic mean is greater than 70 S/mm, the three blank samples must be analyzed. If the three blank samples are greater than 70 S/mm, resampling must be done. If less than 70 S/mm, the five outside samples must be analyzed and a Z-test analysis performed. When the Z-test results are less than 1.65, the decontamination must be considered complete. If the Z-test results are more than 1.65, the abatement is incomplete and

cleaning must be repeated. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at the Contractor's expense.

3.2.13.5 Sampling After Final Clean-Up (Clearance Sampling)

Provide area sampling of asbestos fibers using aggressive air sampling techniques as defined in the EPA 560/5-85-024 and establish an airborne asbestos concentration of less than 0.01 fiber per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP and GC must perform a visual inspection in accordance with ASTM E1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all waste has been removed. Collect regulated number of clearance samples. Use transmission electron microscopy (TEM) to analyze clearance samples and report the results in accordance with current NIOSH criteria. The asbestos fiber counts from these samples must be less than 0.01 fiber per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value take appropriate actions to re-clean the area and repeat the sampling and TEM analysis at the Contractor's expense.

3.2.13.6 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

3.2.14 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean-up of gross contamination, the PQP must conduct a visual inspection of all areas affected by the removal in accordance with ASTM E1368. Inspect for any visible fibers. Spray apply a post removal (lock-down) encapsulant to ceiling, walls, floors and other areas exposed in the removal area. The exposed area includes but is not limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers.

3.2.15 Site Inspection

While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at the Contractor's expense.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of

accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government must have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, become the property of the Contractor and must be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Coordinate all waste disposal manifests with the Contracting Officer. Collect asbestos waste, contaminated waste water filters, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on outside of each container the name of waste generator and location at which the waste was generated. Prevent contamination of transport vehicle (especially if transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or their authorized representative. Comply with 40 CFR 61-SUBPART M, State, regional, and local standards for hauling and disposal. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. Workers unloading sealed drums must

wear appropriate respirators and personal protective equipment when handling asbestos materials at disposal site.

3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released for disposal.

-- End of Section --

SECTION 02 83 00

LEAD REMEDIATION
11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2	(2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM E1727	(2016) Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination
ASTM E1728	(2016) Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2019) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.103	Respiratory Protection
29 CFR 1926.1126	Chromium

29 CFR 1926.1127	Cadmium
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Dec 2017) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Abatement

Measures defined in 40 CFR 745, Section 223, designed to permanently eliminate lead-based paint hazards.

1.2.2 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period; to an airborne concentration of cadmium of 2.5 micrograms per cubic meter of air averaged over an 8-hour period; to an airborne concentration of chromium (VI) of 2.5 micrograms per cubic meter of air averaged over an 8-hour period.

1.2.3 Area Sampling

Sampling of lead, cadmium, chromium concentrations within the lead,

cadmium, chromium control area and inside the physical boundaries which is representative of the airborne lead, cadmium, chromium concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

1.2.4 Cadmium Permissible Exposure Limit (PEL)

Five micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.1127. If an employee is exposed for more than 8 hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 40/No. hrs worked per day

1.2.5 Certified Industrial Hygienist (CIH)

As used in this section refers to a person retained by the Contractor who is certified as an industrial hygienist and who is trained in the recognition and control of lead, cadmium and chromium hazards in accordance with current federal, State, and local regulations. CIH must be certified for comprehensive practice by the American Board of Industrial Hygiene. The Certified Industrial Hygienist must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.2.6 Chromium Permissible Exposure Limit (PEL)

Five micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.1126. If an employee is exposed for more than 8 hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 40/No. hrs worked per day

1.2.7 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead, cadmium and chromium hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead, cadmium and chromium hazard. The Contractor may provide more than one CP as required to supervise and monitor the work. The CP must be a Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals or a licensed lead-based paint abatement Supervisor/Project Designer in the State of New Mexico.

1.2.8 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.9 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.10 Deleading

Activities conducted by a person who offers to eliminate lead-based paint

or lead-based paint hazards or paints containing cadmium/chromium or to plan such activities in commercial buildings, bridges or other structures.

1.2.11 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead, cadmium, chromium to which an employee is exposed, averaged over an 8-hour workday as indicated in 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.2.12 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead, cadmium, chromium-contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.2.13 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds. The use of the term Lead in this section also refers to paints which contain detectable concentrations of Cadmium and Chromium. For the purposes of the section lead-based paint (LBP) and paint with lead (PWL) also contains cadmium and chromium.

1.2.14 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

1.2.15 Lead-Based Paint Activities

In the case of target housing or child occupied facilities, lead-based paint activities include; a lead-based paint inspection, a risk assessment, or abatement of lead-based paint hazards.

1.2.16 Lead-Based Paint Hazards

Paint-lead hazard, dust-lead hazard or soil-lead hazard as identified in 40 CFR 745, Section 65. Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.2.17 Lead, Cadmium, Chromium Control Area

A system of control methods to prevent the spread of lead, cadmium, chromium dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.18 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than 8-hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.19 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.20 Personal Sampling

Sampling of airborne lead, cadmium, chromium concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Samples must be representative of the employees' work tasks. Breathing zone must be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.21 Physical Boundary

Area physically roped or partitioned off around lead, cadmium, chromium control area to limit unauthorized entry of personnel.

1.3 DESCRIPTION

Construction activities impacting PWL or material containing lead, which are covered by this specification, include the demolition or removal of material containing lead, cadmium, chromium in all condition. The work covered by this section includes work tasks and the precautions specified in this section for the protection of building occupants and the environment during and after the performance of the hazard abatement activities.

1.3.1 Protection of Existing Areas to Remain

Project work including, but not limited to, lead, cadmium, chromium hazard abatement work, storage, transportation, and disposal must be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, restore work and areas to the original condition.

1.3.2 Coordination with Other Work

Coordinate with work being performed in adjacent areas to ensure there are no exposure issues. Explain coordination procedures in the Lead, Cadmium, Chromium Compliance Plan and describe how the Contractor will prevent lead, cadmium and chromium exposure to other contractors and Government personnel performing work unrelated to lead, cadmium and chromium activities.

1.3.3 Sampling and Analysis

Submit a log of the analytical results from sampling conducted during the abatement. Keep the log of results current with project activities and brief the results to the Contracting Officer as analytical results are reported.

1.3.3.1 Dust Wipe Materials, Sampling and Analysis

Sampling must conform to ASTM E1728.

1.3.3.2 Soil Sampling and Analysis

Sampling must conform to ASTM E1727.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Competent Person Qualifications; G

Training Certification; G

Medical Examinations; G

Lead, Cadmium, Chromium Waste Management Plan; G

Occupant Protection Plan; G

Lead, Cadmium, Chromium Compliance Plan; G

Written Evidence of TSD Approval; G

SD-03 Product Data

Respirators; G

Vacuum Filters; G

Negative Air Pressure System; G

Materials and Equipment; G

Expendable Supplies; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Pressure Differential Log; G

SD-06 Test Reports

Sampling and Analysis; G

Environmental Assessment Data Report; G

Sampling Results; G

Pressure Differential Recordings For Local Exhaust System; G

SD-07 Certificates

Testing Laboratory; G

SD-11 Closeout Submittals

Hazardous Waste Manifest; G

Turn-In Documents or Weight Tickets; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph COMPETENT PERSON (CP) RESPONSIBILITIES. Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (29 CFR 1926.62), Chromium standard (29 CFR 1926.1126), Cadmium standard (29 CFR 1926.1127) which shows ability to assess occupational and environmental exposure to lead, cadmium, chromium; experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Demonstrate a minimum of 3 years' experience implementing OSHA's Lead in Construction standard (29 CFR 1926.62), Chromium standard (29 CFR 1926.1126), and Cadmium standard (29 CFR 1926.1127). Submit proper documentation that the CP is trained, licensed, and certified in accordance with federal, State of New Mexico, and local laws.

1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead, cadmium and chromium training specified in 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, 40 CFR 745, and is certified to perform or supervise deleading, lead removal or demolition activities in the State of New Mexico.

1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air analysis, testing, and reporting of airborne concentrations of lead, cadmium and chromium. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve Lead, Cadmium, Chromium Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect LBP/PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead, cadmium, chromium control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead, Cadmium, Chromium Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of lead, cadmium and chromium, LBP/PWL or MCL. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead, cadmium, chromium is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead, cadmium, chromium related work, collected waste water and dust containing lead, cadmium, chromium and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead, cadmium, chromium is not released outside of the lead, cadmium, chromium control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

1.5.2.3 Environmental Assessment Data Report

If initial monitoring is necessary, submit environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 the Contractor must provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62,29 CFR 1926.1126, 29 CFR 1926.1127 and supporting the Lead, Cadmium, Chromium Compliance Plan.

a. The initial monitoring must represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62,29 CFR 1926.1126, 29 CFR 1926.1127. The data must represent the worker's regular daily exposure to lead, cadmium, chromium for stated work.

b. Submit worker exposure data gathered during the task-based trigger operations of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead, cadmium and chromium containing coatings are present.

c. The initial assessment must determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead, cadmium, chromium compliance plan per 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.5.2.4 Medical Examinations

Submit pre-work blood lead levels and post-work blood lead levels for all workers performing lead, cadmium, chromium activities during the execution of the work. Initial medical surveillance as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 must be made available to all employees exposed to lead, cadmium, chromium at any time (one day) above the action level. Full medical surveillance must be made available to all employees on an annual basis who are or may be exposed to lead, cadmium and chromium in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead, cadmium, chromium as indicated in 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.5.2.5 Training

Train each employee performing work that disturbs lead, cadmium, chromium, who performs LBP/MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, 40 CFR 745 and State of New Mexico and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

b. Establish and implement a respiratory protection program as required by 29 CFR 1926.103, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by

29 CFR 1926.59.

1.5.2.8 Lead, Cadmium, Chromium Waste Management

The Lead, Cadmium, Chromium Waste Management Plan must comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

a. Identification and classification of wastes associated with the work.

b. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of State permits, manifests, and USEPA Identification numbers.

c. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

d. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

e. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

f. Work plan and schedule for waste containment, removal and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Clean up and containerize wastes daily.

g. Include any process that may alter or treat waste rendering a hazardous waste nonhazardous.

h. Unit cost for hazardous waste disposal according to this plan.

1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, State, and local authorities regarding lead, cadmium and chromium. Comply with the applicable requirements of the current issue of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, and EM 385-1-1. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements apply.

1.5.3 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inch of water relative to the pressure external to the enclosure and operate it continuously, 24 hours a day, until the temporary enclosure of the lead, cadmium, chromium control area is removed. Submit pressure differential recordings for each work day to the PQP and GC for review and to the Contracting Officer within 24 hours from the end of each work day.

1.5.4 Occupant Protection Plan

The certified project designer must develop and implement an Occupant Protection Plan describing the measures and management procedures to be

taken during lead, cadmium and chromium hazard abatement activities to protect the building occupants/building facilities and the outside environment from exposure to any lead, cadmium and chromium contamination while lead, cadmium and chromium hazard abatement activities are performed.

1.5.5 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead, Cadmium, Chromium Waste Management Plan and the Lead, Cadmium, Chromium Compliance Plan, including procedures and precautions for the work.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead, cadmium and chromium dust, fume and mist. Respirators must comply with the requirements of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.6.2 Special Protective Clothing

Personnel exposed to lead, cadmium, chromium contaminated dust must wear proper disposable protective whole-body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead, cadmium and chromium removal work within the lead, cadmium and chromium controlled area. Personal protective equipment must include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE remains the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.6.6 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

1.6.7 Negative Air Pressure System

1.6.7.1 Minimum Requirements

Do not proceed with work in the area until containment is set up and HEPA filtration systems are in place. The negative air pressure system must meet the requirements of ASSP Z9.2 including approved HEPA filters in accordance with UL 586. Negative air pressure equipment must be equipped with new HEPA filters, and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed as follows:

a. The unit must be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.

b. The HEPA filter must be certified as being capable of trapping and retaining mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

c. The unit must be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 2.5 inches of water static pressure differential on a magnehelic gauge.

d. Equip the unit with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer must be calibrated daily as recommended by the manufacturer.

e. Equip the unit with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.

f. Equip the unit with an electronic mechanism that automatically shuts the machine off in the event of a filter breach or absence of a filter.

g. Equip the unit with an audible horn that sounds an alarm when the machine has shut itself off.

h. Equip the unit with an automatic safety mechanism that prevents a worker from improperly inserting the main HEPA filter.

1.6.7.2 Auxiliary Generator

Provide an auxiliary generator with capacity to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls must automatically start the generator and switch the negative air pressure system machines to generator power. The generator must not present a carbon monoxide hazard to workers.

1.6.8 Vacuum Systems

Vacuum systems must be suitably sized for the project, and filters must be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers (mean aerodynamic diameter) at a minimum efficiency of 99.97 percent. Properly dispose of used filters that are being replaced.

1.6.9 Heat Blower Guns

Heat blower guns must be flameless, electrical, paint-softener type with controls to limit temperature to 1,100 degrees F. Heat blower must be (grounded) 120 volts ac, and must be equipped with cone, fan, glass protector and spoon reflector nozzles.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Keep materials and equipment needed to complete the project available and on the site. Submit a description of the materials and equipment required; including Safety Data Sheets (SDSs) for material brought onsite to perform the work.

2.1.1 Expendable Supplies

Submit a description of the expendable supplies required.

2.1.1.1 Polyethylene Bags

Disposable bags must be polyethylene plastic and be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

2.1.1.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead, cadmium, chromium contaminated debris must be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

2.1.1.3 Polyethylene Sheeting

Sheeting must be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, provide flame-resistant polyethylene sheets which conform to the requirements of NFPA 701.

2.1.1.4 Tape and Adhesive Spray

Tape and adhesive must be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive must retain adhesion when exposed to wet conditions, including amended water. Tape must be minimum 2 inches

wide, industrial strength.

2.1.1.5 Containers

When used, containers must be leak-tight and be labeled in accordance with EPA, DOT and OSHA standards.

2.1.1.6 Chemical Paint Strippers

Chemical paint strippers must not contain methylene chloride and be formulated to prevent stain, discoloration, or raising of the substrate materials.

2.1.1.7 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers must be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

2.1.1.8 Detergents and Cleaners

Detergents or cleaning agents must not contain trisodium phosphate and have demonstrated effectiveness in lead, cadmium and chromium control work using cleaning techniques.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any lead, cadmium and chromium work.

3.1.1.2 Lead, Cadmium, Chromium Control Area

a. Physical Boundary - Provide physical boundaries around the lead, cadmium, chromium control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead, cadmium and chromium will not escape outside of the lead, cadmium and chromium control area. Prohibit the general public from accessing the lead, cadmium, chromium control areas.

b. Warning Signs - Provide warning signs at approaches to lead, cadmium, chromium control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs must comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings

Furniture and equipment will remain in the building. Protect and cover furnishings or remove furnishings from the work area and store in a location approved by the Contracting Officer.

3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead, cadmium, chromium control areas. Seal intake and exhaust vents in the lead, cadmium, chromium control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead, cadmium, chromium control area. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead, cadmium, chromium control area.

3.1.1.5 Local Exhaust System

Provide a local exhaust system in the lead, cadmium, chromium control area in accordance with ASSP Z9.2, 29 CFR 1926.62, 29 CFR 1926.1126 and 29 CFR 1926.1127 that will provide at least 4 air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24 hours per day, until the lead, cadmium, chromium control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the lead, cadmium, chromium control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the lead, cadmium, chromium control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

3.1.1.6 Negative Air Pressure System Containment

a. Operate the negative air pressure systems to provide at least 4 air changes per hour inside the containment. Operate the local exhaust unit equipment continuously until the containment is removed. Smoke test the negative air pressure system for leaks at the beginning of each shift. The certified supervisor is responsible to continuously monitor and keep a pressure differential log with an automatic manometric recording instrument. Notify the Contracting Officer immediately if the pressure differential falls below the prescribed minimum. Submit the continuously monitored pressure differential log, as specified. Do not use the building ventilation system as the local exhaust system. Terminate the local exhaust system out of doors unless the Contracting Officer allows an alternate arrangement. All filters must be new at the beginning of the project and be periodically changed as necessary to maintain specified pressure differential and disposed of as lead, cadmium and chromium contaminated waste.

b. Discontinuing Negative Air Pressure System. Operate the negative air pressure system continuously during abatement activities unless otherwise authorized by the Contracting Officer. At the completion of the project, units must be run until full cleanup has been completed. Dismantling of the negative air pressure systems must be as presented in the Lead, Cadmium, Chromium Compliance Plan. Seal the HEPA filter machine intakes with polyethylene to prevent environmental contamination.

3.1.1.7 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in

accordance with this specification and 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

3.1.1.8 Eye Wash Station

Provide suitable facilities within the work area for quick drenching or flushing of the eyes where eyes may be exposed to injurious corrosive materials.

3.1.1.9 Mechanical Ventilation System

a. Use adequate ventilation to control personnel exposure to lead, cadmium and chromium in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Evaluate and maintain local exhaust ventilation systems in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

3.1.1.10 Personnel Protection

Personnel must wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead, cadmium, chromium control area. No one will be permitted in the lead, cadmium, chromium control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead, Cadmium, Chromium Control Area Requirements

Establish a lead, cadmium, chromium control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

Full containment - Contain removal operations by the use of a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the CP. For containment areas larger than 1,000 square feet install a minimum of two 18-inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.

3.3 APPLICATION

3.3.1 Lead, Cadmium, Chromium Work

Perform lead, cadmium, chromium work in accordance with approved Lead, Cadmium, Chromium Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead, cadmium, chromium when the work is performed in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

3.3.2 Paint with Lead, Cadmium, Chromium or Material Containing Lead, Cadmium, Chromium Removal

Provide methodology for removing lead in the Lead, Cadmium, Chromium Compliance Plan. Select lead, cadmium, and chromium removal processes to minimize contamination of work areas outside the control area with lead, cadmium, chromium contaminated dust or other lead, cadmium, chromium contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead, cadmium, chromium. Describe this removal process in the Lead, Cadmium, Chromium Compliance Plan.

Provide methodology for lead, cadmium, chromium, LBP/PWL removal or abatement/control and processes to minimize contamination of work areas outside the control area with lead, cadmium, chromium contaminated dust or other lead, cadmium, chromium contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead, cadmium, chromium. Describe this lead,, cadmium and chromium, LBP/PWL removal/control process in the Lead, Cadmium, Chromium Compliance Plan.

3.3.2.1 Paint with Lead, Cadmium, Chromium or Material Containing Lead, Cadmium, Chromium - Indoor Removal

Perform manual or mechanical removal and thermal cutting in the lead, cadmium, chromium control areas using enclosures, barriers or containments. Collect residue and debris for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Paint with Lead, Cadmium, Chromium or Material Containing Lead, Cadmium, Chromium - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead, Cadmium, Chromium Compliance Plan. The worksite preparation (barriers or containments) must be job dependent and presented in the Lead, Cadmium, Chromium Compliance Plan.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead, cadmium, chromium controlled area, they must perform the following procedures and must not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room and place them in an approved impermeable disposal bag.

c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.

d. Change to clean clothes prior to leaving the clean clothes storage area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead, cadmium, chromium in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and as specified herein. Air and wipe sampling must be directed or performed by the CP.

a. The CP must be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72-hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead, cadmium and chromium and lead-based paint removal operations are performed, in areas immediately adjacent to the lead, cadmium and chromium control area. Conduct sufficient area monitoring to ensure unprotected personnel are not exposed at or above 30 micrograms of lead per cubic meter of air or 2.5 micrograms of cadmium/chromium per cubic meter of air. If 30 micrograms of lead per cubic meter of air or 2.5 micrograms of cadmium/chromium per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Resume removal work only after the CP and the Contracting Officer give approval.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead, cadmium, chromium control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead, cadmium, chromium operation has been completed, clean the controlled area of all visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead, Cadmium, Chromium Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP must then certify in writing that the area has been cleaned of lead, cadmium and chromium contamination before clearance testing.

3.5.1.1 Clearance Certification

The CP must certify in writing that air samples collected outside the lead, cadmium, chromium control area during paint removal operations are less than 30 micrograms of lead per cubic meter of air and less than 2.5 micrograms of cadmium/chromium per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127; and that there were no visible accumulations of material and dust containing lead, cadmium, chromium left in the work site. Do not remove the lead, cadmium, chromium control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

Clear the lead, cadmium, chromium control area in industrial facilities of all visible dust and debris.

For lead, cadmium and chromium-based paint hazard abatement work, surface wipe and soil sampling must be conducted and clearance determinations made according to the work practice standards presented in 40 CFR 745.227.

3.5.2 Disposal

a. Dispose of material, whether hazardous or nonhazardous in accordance with all laws and provisions and all federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead, cadmium, chromium contaminated waste, scrap, debris, bags, containers, equipment, and lead, cadmium, chromium contaminated clothing that may produce airborne concentrations of lead, cadmium, chromium particles. Label the containers in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 40 CFR 261, 40 CFR 262 and corresponding state regulations.

c. Dispose of lead, cadmium, chromium contaminated material classified as hazardous waste at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.

d. Accumulate waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums or appropriately sized container for smaller volumes. Properly label each drum to identify the type of hazardous material (49 CFR 172). For hazardous waste, the collection container requires marking/labeling in accordance with 40 CFR 262 and corresponding state regulations during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for accumulation of waste containers. Coordinate authorized accumulation volumes and time limits with the host installation environmental function.

e. Handle, store, transport, and dispose lead, cadmium, chromium or lead, cadmium, chromium contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

f. All lead, cadmium, and chromium waste generation, management, and

disposal will be coordinated with the host installation environmental function.

3.5.2.1 Disposal Documentation

Coordinate all disposal or offsite shipments of lead, cadmium, and chromium waste with the host installation environmental function. Submit written evidence of TSD approval to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead, cadmium, chromium disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for nonhazardous waste disposal.

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and nonhazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility is received and approved by the Contracting Officer. The manifest must detail and certify the amount of lead, cadmium, chromium containing materials or nonhazardous waste delivered to the treatment or disposal facility.

-- End of Section --

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PROJECT SPECIFICATIONS

Department of Veterans Affairs
New Mexico VA Health Care System
Repair-Replace Elevators in B-41
VA Project No. 501-19-101

100% Bid Documents
January 27, 2023

Prepared by:
Apogee Consulting Group, PA
1151 Kildaire Farm Road
Cary, NC 27511

VA | U.S. Department of Veterans Affairs

APOGEE

Engineers | Architects

New Mexico VA Health Care System

Project #501-19-101

Repair-Replace Elevators in B-41

Contract Number:
36C25819D0036

Task Order:
36C25819N0403

100% Bid Documents

Submittal Register

January 27, 2023

VA | U.S. Department of Veterans Affairs

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
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Spec Section 01 00 00 General Requirements																					
		1.5A	Security Plan:	NA	NA																
		1.5A.1	The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.	NA	GOV																
		1.5A.2	The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.	NA	GOV																
		1.5C	Key Control:	NA	NA																
		1.5C.1	For any door controlling entrance to the construction area(s), the VA will supply to the contractor a door lock and/or its corresponding key, the contractor will provide all remaining door hardware to support the ABQ VA keying system. Upon project completion, the General Contractor must return the lock and key to the COR.	NA	GOV																
		1.5D	Document Control:	NA	NA																
		1.5D.1	Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of “sensitive information”.	NA	GOV																
		1.5D.2	The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.	NA	GOV																
		1.5D.3	Certain documents, sketches, videos or photographs and drawings may be marked “Law Enforcement Sensitive” or “Sensitive Unclassified”. Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.	NA	GOV																
		1.5D.4	These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.	NA	GOV																
		1.5D.5	All paper waste or electronic media such as CD’s and diskettes shall be shredded and destroyed in a manner acceptable to the VA.	NA	GOV																
		1.5D.6	Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of “sensitive information”.	NA	GOV																
		1.5D.7	All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).	NA	GOV																
		1.5D.7a	Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.	NA	GOV																
		1.5D.7b	“Sensitive information” including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.	NA	GOV																
		1.13	Warranty Management	NA	NA																

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		1.13A	Warranty Management Plan: (1) Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction at least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan to the COR. (2) Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. (3) The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesman, or of engineering background, not necessarily familiar with this contract. (4) The term "status" as indicated below must include due date and whether item has been submitted or was approved. (5) Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly invoice for payment. (6) Assemble approved information in a binder and turn over to the Government upon acceptance of the work. (7) The construction warranty period will begin on the date of the project acceptance and continue for the product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contactor and the Contracting Officer. (8) Include in the warranty management plan, but not limited to, the following:	NA	GOV															
		1.13A.1	Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the company of the Contractor, subcontractors, manufacturers or suppliers involved.	NA	GOV															
		1.13A.2	Furnish with each warranty the name, address and telephone number of each of the guarantor's representatives nearest project location.	NA	GOV															
		1.13A.3	Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers and for all commissioned systems such as fire protection and alarm systems, sprinkler systems and lightning protection systems, etc.	NA	GOV															
		1.13A.4	A list for each warranted equipment item, feature of construction or system indicating:	NA	GOV															
		1.13A.4a	Name of item.	NA	GOV															
		1.13A.4b	Model and serial numbers.	NA	GOV															
		1.13A.4c	Location where installed.	NA	GOV															
		1.13A.4d	Name and phone numbers of manufacturers and suppliers	NA	GOV															
		1.13A.4e	Name and phone numbers of manufacturers or suppliers	NA	GOV															
		1.13A.4f	Names, addresses and phone numbers of sources of spare parts	NA	GOV															
		1.13A.4g	Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.	NA	GOV															
		1.13A.4h	Starting point and duration of warranty period.	NA	GOV															
		1.13A.4i	Summary of maintenance procedures required to continue the warranty in force.	NA	GOV															

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		1.13A.4j	Cross-reference to specific pertinent Operation and Maintenance manuals.	NA	GOV																
		1.13A.4k	Organizations, names and phone numbers of persons to call for warranty service.	NA	GOV																
		1.13A.4l	Typical response time and repair time expected for various warranted equipment.	NA	GOV																
		1.13A.5	The plans for attendance at the 4 and 9-month post construction warranty inspections conducted by the government.	NA	GOV																
		1.13A.6	Procedure and status of tagging of all equipment covered by extended warranties.	NA	GOV																
		1.13A.7	Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.	NA	GOV																
Spec Section 01 45 00 Quality Control																					
		1.3A	Government approval is required for all submittals. CQC inspection reports shall be submitted under this Specification section and follow the [Applicable CQC Control Phase (Preparatory, Initial, or Follow-Up)]: [Applicable Specification section] naming convention.	NA	NA																
		1.3A.1	Preconstruction Submittals	NA	GOV																
		1.3A.1a	Interim CQC Plan	NA	GOV																
		1.3A.1b	CQC Plan	NA	GOV																
		1.3A.1c	Additional Requirements for Design Quality Control (DQC) Plan.	NA	GOV																
		1.3A.2	Design Data	NA	GOV																
		1.3A.2a	Discipline-Specific Checklists	NA	GOV																
		1.3A.2b	Design Quality Control	NA	GOV																
		1.3A.3	Test Reports	NA	GOV																
		1.3A.3a	Verification Statement	NA	GOV																
Spec Section 01 91 00 General Commissioning Requirements				**GOV**																	
		1.13A	Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:	NA	GOV																
		1.13A.1	The Commissioning Team: A list of commissioning team members by organization.	NA	GOV																
		1.13A.2	Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).	NA	GOV																
		1.13A.3	Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.	NA	GOV																

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		1.13A.4	Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.	NA	GOV																
		1.13A.5	Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.	NA	GOV																
		1.13A.6	Pre-Functional Checklists: Preliminary Pre- Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre- Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.	NA	GOV																
		1.13A.7	Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system's testing.	NA	GOV																
		1.13B	Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor's project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.	NA	GOV																
		1.13C	Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.	NA	GOV																
		1.13D	Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.	NA	GOV																
		1.13E	Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.	NA	GOV																
		1.13F	Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA COR with copies to the Contractor and Architect.	NA	GOV																
		1.13G	Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.	NA	GOV																

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		1.13H	Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.	NA	GOV															
		1.13I	Data for Commissioning:	NA	GOV															
		1.13I.1	The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.	NA	GOV															
		1.13I.2	The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.	NA	GOV															
Spec Section 02 82 13.13			**Glovebag Asbestos Abatement**																	
		2.5.1	Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project:	A	GOV															
		2.5.1A	Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.	A	GOV															
		2.5.1B	Submit a staff organization chart showing all personnel who shall be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.	A	GOV															
		2.5.1C	Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.	A	GOV															
		2.5.1D	Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:	A	GOV															
		2.5.1D.1	Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.	A	GOV															
		2.5.1D.2	Waste water filtration system, shower system, containment barriers.	A	GOV															
		2.5.1D.3	Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.	A	GOV															
		2.5.1D.4	Respirators, protective clothing, personal protective equipment.	A	GOV															
		2.5.1D.5	Fire safety equipment to be used in the regulated area.	A	GOV															
		2.5.1E	Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.	A	GOV															

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		2.5.1F	Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.	A	GOV																
		2.5.1G	Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring shall be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.	A	GOV																
		2.5.1H	Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.	A	GOV																
		2.5.1H.1	Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date	A	GOV																
		2.5.1H.2	List project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; and Resolution.	A	GOV																
		2.5.1H.3	List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.	A	GOV																
		2.5.1I	Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.	A	GOV																
		2.5.1I.1	CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.	A	GOV																
		2.5.1I.2	Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.	A	GOV																

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		2.5.1I.3	Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.	A	GOV																
		2.5.1J	Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and Asbestos Hazard Abatement Plans; copies of monitoring results of the five referenced projects listed and analytical method(s) used.	A	GOV																
		2.5.1K	Rented equipment shall be decontaminated prior to returning to the rental agency.	A	GOV																
		2.5.1L	Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS, and application instructions.	A	GOV																
		2.5.2A	The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWAs/ELs. Submit this information daily to the VPIH/CIH.	A	GOV																
		2.5.2B	The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.	A	GOV																
		2.5.2B.1	Removal of any poly barriers.	A	GOV																
		2.5.2B.2	Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.	A	GOV																
		2.5.2B.3	Packaging and removal of ACM waste from regulated area.	A	GOV																
		2.5.2B.4	Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the COR on a weekly basis.	A	GOV																
		2.5.3A	The CPIH/CIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It shall also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with Attachment #1. All clearance and perimeter area samples shall be submitted. The COR shall retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office	A	GOV																

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PROJECT NO:	501-19-101 | ACG: 19-262	CONTRACT NO:	36C25819D0036			
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Spec Section 05 50 00 Metal Fabrications																		
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.3B	Shop Drawings:	A	GOV													
		1.3B.1	Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.	A	GOV													
		1.3B.2	Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.	A	GOV													
		1.3B.3	Provide templates and rough-in measurements as required.	A	GOV													
		1.3C	Manufacturer's Certificates:	A	GOV													
		1.3C.1	Anodized finish as specified.	A	GOV													
		1.3C.2	Live load designs as specified.	A	GOV													
		1.3D	Design Calculations for specified live loads including dead loads.	A	GOV													
		1.3E	Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.	A	GOV													
Spec Section 05 59 00 Metal Restoration and Cleaning																		
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.3B	Shop Drawings:	A	GOV													
		1.3B.1	Each item specified, showing complete detail, location in the project, material and size of components, finish, and location.	A	GOV													
Spec Section 06 10 00 Rough Carpentry																		
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.3B	Shop Drawings showing framing connection details, fasteners, connections and dimensions.	A	GOV													
		1.3C	Manufacturer's Literature and Data:	A	GOV													
		1.3C.1	Submit data for lumber, panels, hardware and adhesives.	A	GOV													
		1.3C.2	Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.	A	GOV													
		1.3C.3	Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.	A	GOV													
		1.3C.4	For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.	A	GOV													
		1.3D	Manufacturer's certificate for unmarked lumber.	A	GOV													
Spec Section 07 72 00 Roof Accessories																		

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code			
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.4B	Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.	A	GOV															
		1.4C	Manufacturer's Literature and Data: Each item specified.	A	GOV															
		1.4D	Certificates: Stating that aluminum has been given specified thickness of anodizing.	A	GOV															
Spec Section 07 81 00 Applied Fireproofing																				
		1.2A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.2B	Sustainable Design Submittals, as described below:	A	GOV															
		1.2B.1	Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.	A	GOV															
		1.2C	Installer qualifications.	A	GOV															
		1.2D	Testing laboratory accreditations.	A	GOV															
		1.2E	Manufacturer's Literature and Data:	A	GOV															
		1.2E.1	Manufacturer's complete and detailed application instructions and specifications.	A	GOV															
		1.2E.2	Manufacturer's repair and patching instructions.	A	GOV															
		1.2F	Certificates:	A	GOV															
		1.2F.1	Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.	A	GOV															
		1.2F.1a	List thickness and density of material required to meet fire ratings.	A	GOV															
		1.2F.1b	Accompanied by complete test report and test record.	A	GOV															
		1.2F.2	Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.	A	GOV															
		1.2G	Miscellaneous:	A	GOV															
		1.2G.1	Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.	A	GOV															
		1.2G.2	Manufacturer's written approval of completed installation.	A	GOV															
		1.2G.3	Manufacturer's written approval of the applicators of fireproofing material.	A	GOV															
Spec Section 07 84 00 Firestopping																				
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.3B	Sustainable Design Submittals, as described below:	A	GOV															
		1.3B.1	Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.	A	GOV															
		1.3C	Installer qualifications.	A	GOV															
		1.3D	Inspector qualifications.	A	GOV															
		1.3E	Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.	A	GOV															
		1.3F	List of FM, UL, or WH classification number of systems installed.	A	GOV															
		1.3G	Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.	A	GOV															
		1.3H	Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.	A	GOV															

			PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
			LOCATION:	Albuquerque, NM																	
			PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
			CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code	
Spec Section 07 92 00 Joint Sealants																					
		1.5A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.5B	Sustainable Design Submittals, as described below:	A	GOV																
		1.5B.1	Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.	A	GOV																
		1.5C	Installer qualifications.	A	GOV																
		1.5D	Contractor certification.	A	GOV																
		1.5E	Manufacturer's installation instructions for each product used.	A	GOV																
		1.5F	Cured samples of exposed sealants for each color.	A	GOV																
		1.5G	Manufacturer's Literature and Data:	A	GOV																
		1.5G.1	Primers	A	GOV																
		1.5G.2	Sealing compound, each type, including compatibility when different sealants are in contact with each other.	A	GOV																
		1.5H	Manufacturer warranty.	A	GOV																
Spec Section 08 11 13 Hollow Metal Doors and Frames																					
		1.4A	Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.4B	Submittal Drawings:	A	GOV																
		1.4B.1	Show size, configuration, and fabrication and installation details.	A	GOV																
		1.4C	Manufacturer's Literature and Data:	A	GOV																
		1.4C.1	Description of each product.	A	GOV																
		1.4C.2	Include schedule showing each door and frame requirements fire label for openings.	A	GOV																
		1.4C.3	Installation instructions.	A	GOV																
		1.4D	Sustainable Construction Submittals:	A	GOV																
		1.4D.1	Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.	A	GOV																
		1.4E	Test reports: Certify products comply with specifications.	A	GOV																
		1.4E.1	Sound rated door.	A	GOV																
		1.4F	Qualifications: Substantiate qualifications comply with specifications.	A	GOV																
		1.4F.1	Manufacturer.	A	GOV																
Spec Section 08 71 00 Door Hardware																					
		1.6A	Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).	NA	NA																
		1.6B	Hardware Schedule: Prepare and submit hardware schedule in the following form:	A	GOV																
			See chart in specification	A	GOV																
		1.6C	Samples and Manufacturers' Literature:	A	GOV																
		1.6C.1	Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.	A	GOV																

PROJECT:	Repair-Replace Elevators in B-41																		SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM																		
PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
CONTRACTOR:						TASK ORDER NO:	36C25819N0403												

Activity #	Transmittal #	Paragraph #	Description	REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
				A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code	
		1.6C.2	Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.	A	GOV													
		1.6D	Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.	A	GOV													
Spec Section 09 05 16 Subsurface Preparation for Floor Finishes																		
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.	NA	NA													
		1.3B	Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer	A	GOV													
		1.3C	Product Data:	A	GOV													
		1.3C.1	Moisture remediation system	A	GOV													
		1.3C.2	Underlayment Primer	A	GOV													
		1.3C.3	Cementitious Self-Leveling Underlayment	A	GOV													
		1.3C.4	Cementitious Trowel-Applied Underlayment (Not suitable for resinous floor finishes)	A	GOV													
		1.3D	Test Data:	A	GOV													
		1.3D.1	Moisture test and pH results performed by a qualified independent testing agency or warranty holding manufacturer's technical representative.	A	GOV													
Spec Section 09 22 16 Non-Structural Metal Framing																		
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.4B	Manufacturer's Literature and Data:	A	GOV													
		1.4B.1	Studs, runners and accessories.	A	GOV													
		1.4B.2	Hanger inserts.	A	GOV													
		1.4B.3	Channels (Rolled steel).	A	GOV													
		1.4B.4	Furring channels.	A	GOV													
		1.4B.5	Screws, clips and other fasteners.	A	GOV													
		1.4C	Shop Drawings:	A	GOV													
		1.4C.1	Typical ceiling suspension system.	A	GOV													
		1.4C.2	Typical metal stud and furring construction system including details around openings and corner details.	A	GOV													
		1.4C.3	Typical shaft wall assembly	A	GOV													
		1.4C.4	Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.	A	GOV													
		1.4D	Test Results: Fire rating test designation, each fire rating required for each assembly.	A	GOV													
Spec Section 09 29 00 Gypsum Board																		
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.4B	Manufacturer's Literature and Data:	A	GOV													
		1.4B.1	Cornerbead and edge trim.	A	GOV													

PROJECT:	Repair-Replace Elevators in B-41																		SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM																		
PROJECT NO:	501-19-101 | ACG: 19-262							CONTRACT NO:	36C25819D0036										
CONTRACTOR:								TASK ORDER NO:	36C25819N0403										

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		1.4B.2	Finishing materials.	A	GOV													
		1.4B.3	Laminating adhesive.	A	GOV													
		1.4B.4	Gypsum board, each type.	A	GOV													
		1.4C	Shop Drawings:	A	GOV													
		1.4C.1	Typical gypsum board installation, showing corner details, edge trim details and the like.	A	GOV													
		1.4C.2	Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.	A	GOV													
		1.4C.3	Typical shaft wall assembly.	A	GOV													
		1.4C.4	Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.	A	GOV													
		1.4D	Samples:	A	GOV													
		1.4D.1	Cornerbead.	A	GOV													
		1.4D.2	Edge trim.	A	GOV													
		1.4D.3	Control joints.	A	GOV													
		1.4E	Test Results:	A	GOV													
		1.4E.1	Fire rating test, each fire rating required for each assembly.	A	GOV													
		1.4E.2	Sound rating test.	A	GOV													
		1.4F	Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.	A	GOV													
Spec Section 09 51 00 Acoustical Ceilings																		
		1.5A	Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.5B	Submittal Drawings:	A	GOV													
		1.5B.1	Show size, configuration, and fabrication and installation details.	A	GOV													
		1.5C	Manufacturer's Literature and Data:	A	GOV													
		1.5C.1	Description of each product.	A	GOV													
		1.5C.2	Ceiling suspension system indicating manufacturer recommendation for each application.	A	GOV													
		1.5C.3	Installation instructions.	A	GOV													
		1.5C.4	Warranty.	A	GOV													
		1.5D	Samples:	A	GOV													
		1.5D.1	Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.	A	GOV													
		1.5D.1a	Submit quantity required to show full color and texture range.	A	GOV													
		1.5D.2	Suspension system, trim and molding, 300 mm (12 inches) long.	A	GOV													
		1.5E	Certificates: Certify products comply with specifications.	A	GOV													
		1.5E.1	Acoustical units, each type.	A	GOV													
		1.5F	Qualifications: Substantiate qualifications comply with specifications.	A	GOV													
		1.5F.1	Manufacturer.	A	GOV													
		1.5G	Operation and Maintenance Data:	A	GOV													
		1.5G.1	Care instructions for each exposed finish product.	A	GOV													
Spec Section 09 65 19 Resilient Tile Flooring																		
		1.3A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.3B	Manufacturer's Literature and Data:	A	GOV													
		1.3B.1	Description of each product.	A	GOV													

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
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		1.3B.2	Resilient material manufacturer's recommendations for adhesives, underlayment, primers, and polish.	A	GOV																
		1.3B.3	Application, installation and maintenance instructions.	A	GOV																
		1.3C	Samples:	A	GOV																
		1.3C.1	Tile: Each type, color, thickness and finish.	A	GOV																
		1.3C.2	Edge Strips: Each type, color, thickness and finish.	A	GOV																
		1.3C.3	Feature Strips: Each type, color, thickness and finish.	A	GOV																
		1.3D	Shop Drawings:	A	GOV																
		1.3D.1	Layout of patterns as shown on the construction documents.	A	GOV																
		1.3D.2	Edge strip locations showing types and detail cross sections.	A	GOV																
		1.3E	Test Reports:	A	GOV																
		1.3E.1	Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.	A	GOV																
		1.3E.2	Moisture and pH test results as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.	A	GOV																
Spec Section 09 91 00 Painting																					
		1.2A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.2B	Painter qualifications.	A	GOV																
		1.2C	Manufacturer's Literature and Data:	A	GOV																
		1.2C.1	Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, shall be used to determine compliance with the submittal requirements of this specification. The Contractor shall choose to use subsequent MPI "Approved Product List", however, only one (1) list shall be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate shall be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.	A	GOV																
		1.2D	Manufacturers' Certificates indicating compliance with specified requirements:	A	GOV																
		1.2D.1	Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.	A	GOV																
		1.2D.2	Epoxy coating.	A	GOV																
Spec Section 10 44 13 Fire Extinguisher Cabinets																					
		1.2A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.2B	Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.	A	GOV																
Spec Section 13 05 41 Seismic Restraint Requirements For Non-Structural Components																					
		1.4A	Submit a coordinated set of equipment anchorage drawings prior to installation including:	NA	NA																
		1.4A.1	Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.	A	GOV																

			PROJECT:	Repair-Replace Elevators in B-41															SUBMITTAL REGISTER	
			LOCATION:	Albuquerque, NM																
			PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:		36C25819D0036								
			CONTRACTOR:							TASK ORDER NO:		36C25819N0403								
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		1.4A.2	Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, and welds. clearly identified and specified.	A	GOV															
		1.4A.3	Numerical value of design seismic brace loads.	A	GOV															
		1.4A.4	For expansion bolts, include design load and capacity if different from those specified.	A	GOV															
		1.4B	Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:	A	GOV															
		1.4B.1	Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.	A	GOV															
		1.4B.2	Type of pipe (Copper, steel, cast iron, insulated, non-insulated).	A	GOV															
		1.4B.3	Pipe contents.	A	GOV															
		1.4B.4	Structural framing.	A	GOV															
		1.4B.5	Location of all gravity load pipe supports and spacing requirements.	A	GOV															
		1.4B.6	Numerical value of gravity load reactions.	A	GOV															
		1.4B.7	Location of all seismic bracing.	A	GOV															
		1.4B.8	Numerical value of applied seismic brace loads.	A	GOV															
		1.4B.9	Type of connection (Vertical support, vertical support with seismic brace).	A	GOV															
		1.4B.10	Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.	A	GOV															
		1.4C	Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:	A	GOV															
		1.4C.1	Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.	A	GOV															
		1.4C.2	Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.	A	GOV															
		1.4C.3	Maximum spacing of hangers and bracing.	A	GOV															
		1.4C.4	Seal of registered structural engineer responsible for design.	A	GOV															
		1.4D	Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.	A	GOV															
		1.4E	Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.	A	GOV															
Spec Section 14 12 11 Traction and Winding Drum Dumbwaiter																				
		1.5A	Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA															
		1.5B	Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related cart lift material shall be forwarded to the Contracting Officer.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
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		1.5C	Shop Drawings:	A	GOV															
		1.5C.1	Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each and every cart lift unit specified including:	A	GOV															
		1.5C.1a	Hoisting machine, controller, governor, power conversion devices, and all other components located in machine room.	A	GOV															
		1.5C.1b	Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, size of car platform, and car frame members.	A	GOV															
		1.5C.1c	Rail bracket spacing and maximum vertical forces on guide rails in accordance with VA Seismic Design Manual H-18-8.	A	GOV															
		1.5C.1d	Reactions at points of supports and buffer impact loads.	A	GOV															
		1.5C.1e	Weights of principal parts.	A	GOV															
		1.5C.1f	Top and bottom clearances and over travel of car and counterweight.	A	GOV															
		1.5C.1g	Location of circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.	A	GOV															
		1.5C.2	Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.	A	GOV															
		1.5C.2a	If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.	A	GOV															
		1.5C.2b	Sill details including sill support.	A	GOV															
		1.5D	Samples:	A	GOV															
		1.5D.1	One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).	A	GOV															
		1.5D.2	No other samples of materials specified shall be submitted unless specifically requested after submission of manufacturer's name. If additional samples are furnished pursuant to request, adjustment in contract price and time will be made as provided in Section 00 72 00, GENERAL CONDITIONS.	A	GOV															
		1.5E	Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the cart lift layouts:	A	GOV															
		1.5E.1	Hoisting machine.	A	GOV															
		1.5E.2	Hoisting machine motor, HP rating, and RPM.	A	GOV															
		1.5E.3	Controller.	A	GOV															
		1.5E.4	Starters and overload current protection devices.	A	GOV															
		1.5E.5	Car and counterweight safety devices; maximum and minimum rated loads and rated speeds.	A	GOV															
		1.5E.6	Hoistway door interlocks.	A	GOV															
		1.5E.7	Car and counterweight buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.	A	GOV															
		1.5E.8	Hoist ropes; ultimate breaking strength, allowable working load, and actual working load.	A	GOV															
		1.5F	Complete construction drawings of cart lift enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, and location of car equipment.	A	GOV															
		1.5G	Complete dimensioned detail of vibration- isolating foundation for traction hoisting machine.	A	GOV															
		1.5H	Dimensioned drawings showing details of:	A	GOV															
		1.5H.1	All signal and operating fixtures.	A	GOV															
		1.5H.2	Car and counterweight slide guides.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks	
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		1.5H.3	Hoistway door tracks, hangers, and sills.	A	GOV															
		1.5I	Cuts or drawings showing details of controller.	A	GOV															
Spec Section 14 21 10 Modernization of Traction Elevators																				
		1.5A	Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA															
		1.5B	Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related elevator material shall be forwarded to the Contracting Officer.	A	GOV															
		1.5C	Shop Drawings:	A	GOV															
		1.5C.1	Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each elevator unit specified including:	A	GOV															
		1.5C.1a	Hoisting machines, controllers, power conversion devices, governors, and all other components located in machine room.	A	GOV															
		1.5C.1b	Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, and size of car platform, car frame members, and other components located in hoistway.	A	GOV															
		1.5C.1c	Rail bracket spacing and maximum vertical forces on guide rails in accordance with H 18-8 for Seismic Risk Zone 2 or greater.	A	GOV															
		1.5C.1d	Reaction at points of support and buffer impact loads.	A	GOV															
		1.5C.1e	Weight of principal parts.	A	GOV															
		1.5C.1f	Top and bottom clearances and over travel of car and counterweight.	A	GOV															
		1.5C.1g	Location of main line switch/shunt trip circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.	A	GOV															
		1.5C.2	Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.	A	GOV															
		1.5C.2a	If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.	A	GOV															
		1.5C.2b	Sill details including sill support.	A	GOV															
		1.5D	Samples:	A	GOV															
		1.5D.1	One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).	A	GOV															
		1.5D.2	One each of baked enamel, 75 mm x 125 mm (3 in. x 5 in.).	A	GOV															
		1.5D.3	One each of color floor covering.	A	GOV															
		1.5D.4	One each of protection pads, 75 mm x 125 mm (3 in. x 5 in.) if used.	A	GOV															
		1.5D.5	One each car and hoistway Braille plate sample.	A	GOV															
		1.5D.6	One each car and hall button sample.	A	GOV															
		1.5D.7	One each car and hall lantern/position indicator sample.	A	GOV															
		1.5D.8	One each wall and ceiling material finish sample.	A	GOV															
		1.5D.9	One each car lighting sample.	A	GOV															

PROJECT:	Repair-Replace Elevators in B-41					SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM					
PROJECT NO:	501-19-101 | ACG: 19-262	CONTRACT NO:	36C25819D0036			
CONTRACTOR:		TASK ORDER NO:	36C25819N0403			

Activity #	Transmittal #	Paragraph #	Description	REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
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		1.5E	Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the elevator layouts:	A	GOV													
		1.5E.1	Hoisting Machine.	A	GOV													
		1.5E.2	Hoisting Machine Motor, HP and RPM ratings, Voltage, Starting and Full Load Ampere, and Number of Phases.	A	GOV													
		1.5E.3	Controller.	A	GOV													
		1.5E.4	Starters and Overload Current Protection Devices.	A	GOV													
		1.5E.5	Car Safety Device; Type "B" safeties and Governor.	A	GOV													
		1.5E.6	Electric Door Operator; HP, RPM, Voltage, and Ampere rating of motor.	A	GOV													
		1.5E.7	Hoistway Door Interlocks.	A	GOV													
		1.5E.8	Car and Counterweight Buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.	A	GOV													
		1.5E.9	Cab Ventilation Unit; HP rating and CFM rating.	A	GOV													
		1.5E.10	Hoist and Compensation Ropes; breaking strength, allowable working load, and actual working load.	A	GOV													
		1.5F	Complete construction drawings of elevator car enclosure showing dimensioned details, fastenings to platform, car lighting, ventilation, ceiling framing, top exits, and location of car equipment.	A	GOV													
		1.5G	Complete dimensioned detail of vibration isolating foundations for traction hoisting machines.	A	GOV													
		1.5H	Dimensioned drawings showing details of:	A	GOV													
		1.5H.1	All signal and operating fixtures.	A	GOV													
		1.5H.2	Car and counterweight roller guides.	A	GOV													
		1.5H.3	Hoistway door tracks, hangers, and sills.	A	GOV													
		1.5H.4	Door operator, infrared curtain units.	A	GOV													
		1.5I	Cut sheets and drawings showing details of controllers and supervisory panels.	A	GOV													
		1.5J	Furnish certificates as required under: Paragraph "QUALIFICATIONS."	A	GOV													
Spec Section 21 08 00 Commissioning of Fire Suppression Systems																		
		1.6A	The commissioning process requires review of selected Submittals. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.	NA	NA													
		1.6B	The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.	A	GOV													
Spec Section 21 13 13 Wet-Pipe Sprinkler Systems																		

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4A	Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Prepare detailed working drawings that are signed by a NICET Level III or Level IV Sprinkler Technician or stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering. As the Government review is for technical adequacy only, the installer remains responsible for correcting any conflicts with other trades and building construction that arise during installation. Partial submittals will not be accepted. Material submittals shall be approved prior to the purchase or delivery to the job site. Suitably bind submittals in notebooks or binders and provide an index referencing the appropriate specification section. In addition to the hard copies, provide submittal items in Paragraphs 1.4(A) 1 through 1.4(A) 5 electronically in pdf format on a compact disc or as directed by the COR. Submittals shall include the following:	NA	NA														
		1.4A.1	Qualifications:	NA	NA														
		1.4A.1a	Provide a copy of the installing contractors fire sprinkler and state contractor's license.	A	GOV														
		1.4A.1b	Provide a copy of the NICET certification for the NICET Level III or Level IV Sprinkler Technician who prepared and signed the detailed working drawings unless the drawings are stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering.	A	GOV														
		1.4A.1c	Provide documentation showing that the installer has been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.	A	GOV														
		1.4A.2	Drawings: Submit detailed 1:100 (1/8 inch) scale (minimum) working drawings conforming to the Plans and Calculations chapter of NFPA 13. Drawings shall include graphical scales that allow the user to determine lengths when the drawings are reduced in size. Include a plan showing the piping to the water supply test location.	A	GOV														
		1.4A.3	Manufacturer's Data Sheets: Provide data sheets for all materials and equipment proposed for use on the system. Include listing information and installation instructions in data sheets. Where data sheets describe items in addition to those proposed to be used for the system, clearly identify the proposed items on the sheet.	A	GOV														
		1.4A.4	Calculation Sheets:	A	GOV														
		1.4A.4a	Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of the Plans and Calculations chapter of NFPA 13.	A	GOV														
		1.4A.4b	Submit calculations of loads for sizing of sway bracing in accordance with NFPA 13.	A	GOV														

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.4A.5	Valve Charts: Provide a valve chart that identifies the location of each control valve. Coordinate nomenclature and identification of control valves with COR. Where existing nomenclature does not exist, the chart shall include no less than the following: Tag ID No., Valve Size, Service (control valve, main drain, aux. drain, inspectors test valve) and Location.	A	GOV																
		1.4A.6	Final Document Submittals: Provide as-built drawings, testing and maintenance instructions in accordance with the requirements in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. In addition, submittals shall include the following:	A	GOV																
		1.4A.6a	A complete set of as-built drawings showing the installed system with the specific interconnections between the system switches and the fire alarm equipment. Provide a complete set in the formats as follows. Submit items 2 and 3 below on a compact disc or as directed by the COR.	A	GOV																
		1.4A.6a.1	One full size (or size as directed by the COR) printed copy.	A	GOV																
		1.4A.6a.2	One complete set in electronic pdf format.	A	GOV																
		1.4A.6a.3	One complete set in AutoCAD format or a format as directed by the COR.	A	GOV																
		1.4A.6b	Material and Testing Certificate: Upon completion of the sprinkler system installation or any partial section of the system, including testing and flushing, provide a copy of a completed Material and Testing Certificate as indicated in NFPA 13. Certificates shall be provided to document all parts of the installation.	A	GOV																
		1.4A.6c	Operations and Maintenance Manuals that include step-by-step procedures required for system startup, operation, shutdown, and routine maintenance and testing. The manuals shall include the manufacturer's name, model number, parts list, and tools that should be kept in stock by the owner for routine maintenance, including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization, including address and telephone number, for each item of equipment.	A	GOV																
		1.4A.6d	One paper copy of the Material and Testing Certificates and the Operations and Maintenance Manuals above shall be provided in a binder. In addition, these materials shall be provided in pdf format on a compact disc or as directed by the COR.	A	GOV																
		1.4A.6e	Provide one additional copy of the Operations and Maintenance Manual covering the system in a flexible protective cover and mount in an accessible location adjacent to the riser or as directed by the COR.																		
Spec Section 22 05 11 Common Work Results For Plumbing																					
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.	A	GOV															
		1.4C	Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.	A	GOV															
		1.4D	If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.	A	GOV															
		1.4E	Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.	A	GOV															
		1.4F	Installing Contractor shall provide lists of previous installations for selected items of equipment. Contact persons who will serve as references, with telephone numbers and e-mail addresses shall be submitted with the references.	A	GOV															
		1.4G	Manufacturer's Literature and Data: Manufacturer's literature shall be submitted under the pertinent section rather than under this section.	A	GOV															
		1.4G.1	Electric motor data and variable speed drive data shall be submitted with the driven equipment.	A	GOV															
		1.4G.2	Equipment and materials identification.	A	GOV															
		1.4G.3	Firestopping materials.	A	GOV															
		1.4G.4	Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.	A	GOV															
		1.4G.5	Wall, floor, and ceiling plates.	A	GOV															
		1.4H	Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.	A	GOV															

			PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
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		1.4I	Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8 inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and adequate clearance for all equipment, controls, piping, pumps, valves and other items. All valves, trap primer valves, water hammer arrestors, strainers, and equipment requiring service shall be provided with an access door sized for the complete removal of plumbing device, component, or equipment. Equipment foundations shall not be installed until equipment or piping layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.	A	GOV														
		1.4I.1	Mechanical equipment rooms.	A	GOV														
		1.4I.2	Interstitial space.	A	GOV														
		1.4I.3	Hangers, inserts, supports, and bracing.	A	GOV														
		1.4I.4	Pipe sleeves.	A	GOV														
		1.4I.5	Equipment penetrations of floors, walls, ceilings, or roofs.	A	GOV														
		1.4J	Maintenance Data and Operating Instructions:	A	GOV														
		1.4J.1	Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment. Include complete list indicating all components of the systems with diagrams of the internal wiring for each item of equipment.	A	GOV														
		1.4J.2	Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.	A	GOV														
Spec Section 22 05 12 General Motor Requirements for Plumbing Equipment																			
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA														
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT", with applicable paragraph identification.	A	GOV														
		1.4C	Shop Drawings:	A	GOV														
		1.4C.1	Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.	A	GOV														
		1.4C.2	Motor nameplate information shall be submitted including electrical ratings, dimensions, mounting details, materials, horsepower, power factor, current as a function of speed, current efficiency, speed as a function of load, RPM, enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.	A	GOV														

PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM																	
PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
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		1.4C.3	Motor parameters required for the determination of the Reed Critical Frequency of vertical hollow shaft motors shall be submitted.	A	GOV													
		1.4D	Operating and Maintenance Manuals: Companion copies of complete maintenance and operating manuals, including technical data sheets and application data shall be submitted simultaneously with the shop drawings. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:	A	GOV													
		1.4D.1	Include complete list indicating all components of the systems.	A	GOV													
		1.4D.2	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV													
		1.4D.3	Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.	A	GOV													
		1.4E	Certification: Two weeks prior to final inspection, unless otherwise noted, the following certification shall be submitted to the Contracting Officer's Representative (COR).	A	GOV													
		1.4E.1	Certification shall be submitted stating that the motors have been properly applied, installed, adjusted, lubricated, and tested.	A	GOV													
Spec Section 22 05 19 Meters and Gauges for Plumbing Piping																		
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 19, METERS AND GAUGES FOR PLUMBING PIPING", with applicable paragraph identification.	A	GOV													
		1.4C	Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV													
		1.4C.1	Water Meter.	A	GOV													
		1.4C.2	Pressure Gauges.	A	GOV													
		1.4C.3	Thermometers.	A	GOV													
		1.4C.4	Product certificates for each type of meter and gauge.	A	GOV													
		1.4C.5	BACnet communication protocol.	A	GOV													
		1.4D	Operations and Maintenance manual shall include:	A	GOV													
		1.4D.1	System Description.	A	GOV													
		1.4D.2	Major assembly block diagrams.	A	GOV													
		1.4D.3	Troubleshooting and preventive maintenance guidelines.	A	GOV													
		1.4D.4	Spare parts information.	A	GOV													
		1.4E	Shop Drawings shall include the following: One line, wiring and terminal diagrams including terminals identified, protocol or communication modules, and Ethernet connections.	A	GOV													
Spec Section 22 05 23 General-Duty Valves For Plumbing Piping																		
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													

PROJECT:	Repair-Replace Elevators in B-41			SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM			
PROJECT NO:	501-19-101 | ACG: 19-262	CONTRACT NO:	36C25819D0036	
CONTRACTOR:		TASK ORDER NO:	36C25819N0403	

Activity #	Transmittal #	Paragraph #	Description	REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
				A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code	
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING", with applicable paragraph identification.	A	GOV													
		1.4C	Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV													
		1.4C.1	Ball Valves.	A	GOV													
		1.4C.2	Gate Valves.	A	GOV													
		1.4C.3	Check Valves.	A	GOV													
		1.4D	Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:	A	GOV													
		1.4D.1	Include complete list indicating all components of the systems.	A	GOV													
		1.4D.2	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV													
		1.4D.3	Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.	A	GOV													
		1.4D.4	Piping diagrams of thermostatic mixing valves to be installed.	A	GOV													
Spec Section 22 07 11 Plumbing Insulation																		
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA													
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 07 11, PLUMBING INSULATION", with applicable paragraph identification.	A	GOV													
		1.4C	Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV													
		1.4D	Shop Drawings:	A	GOV													
		1.4D.1	All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM Designation, Federal and Military specifications.	A	GOV													
		1.4D.1a	Insulation materials: Specify each type used and state surface burning characteristics.	A	GOV													
		1.4D.1b	Insulation facings and jackets: Each type used and state surface burning characteristics.	A	GOV													
		1.4D.1c	Insulation accessory materials: Each type used.	A	GOV													
		1.4D.1d	Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation shall follow the guidelines in accordance with ASTM C1710.	A	GOV													
		1.4D.1e	Make reference to applicable specification paragraph numbers for coordination.	A	GOV													
		1.4D.1f	All insulation fittings (exception flexible unicellular insulation) shall be fabricated in accordance with ASTM C450 and the referenced Adjunct to ASTM C450.	A	GOV													
Spec Section 22 14 29 Sump Pumps																		

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks	
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		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 14 29, SUMP PUMPS", with applicable paragraph identification.	A	GOV															
		1.4C	Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV															
		1.4C.1	Pump:	A	GOV															
		1.4C.1a	Manufacturer and model.	A	GOV															
		1.4C.1b	Operating speed (rpm).	A	GOV															
		1.4C.1c	Capacity.	A	GOV															
		1.4C.1d	Characteristic performance curves.	A	GOV															
		1.4C.2	Electric Motor:	A	GOV															
		1.4C.2a	Manufacturer, frame and type.	A	GOV															
		1.4C.2b	Speed.	A	GOV															
		1.4C.2c	Current Characteristics and HP (W).	A	GOV															
		1.4C.2d	Efficiency.	A	GOV															
		1.4C.3	Control panel.	A	GOV															
		1.4C.4	Sensors.	A	GOV															
		1.4D	Certified copies of all the factory and construction site test data sheets and reports.	A	GOV															
		1.4E	Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replacement parts:	A	GOV															
		1.4E.1	Include complete list which indicates all components of the system.	A	GOV															
		1.4E.2	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV															
		1.4E.3	Diagrams shall have their terminals identified to facilitate installation, operation and maintenance, and troubleshooting.	A	GOV															
Spec Section 23 05 11 Common Work Results For HVAC																				
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 05 11, COMMON WORK RESULTS FOR HVAC", with applicable paragraph identification.	A	GOV															
		1.4C	If the project is phased, submit complete phasing plan/schedule with manpower levels prior to commencing work. The phasing plan shall be detailed enough to provide milestones in the process that can be verified.	A	GOV															

PROJECT:	Repair-Replace Elevators in B-41																			SUBMITTAL REGISTER	
LOCATION:	Albuquerque, NM																				
PROJECT NO:	501-19-101 | ACG: 19-262							CONTRACT NO:	36C25819D0036												
CONTRACTOR:								TASK ORDER NO:	36C25819N0403												
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
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		1.4D	Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements, and all equipment that requires regular maintenance, calibration, etc are accessable from the floor or permanent work platform. It is the Contractor's responsibility to ensure all submittals meet the VA specifications and requirements and it is assumed by the VA that all submittals do meet the VA specifications unless the Contractor has requested a variance in writing and approved by COR prior to the submittal. If at any time during the project it is found that any item does not meet the VA specifications and there was no variance approval the Contractor shall correct at no additional cost or time to the Government even if a submittal was approved.	A	GOV															
		1.4E	If equipment is submitted which differs in arrangement from that shown, provide documentation proving equivalent performance, design standards and drawings that show the rearrangement of all associated systems. Additionally, any impacts on ancillary equipment or services such as foundations, piping, and electrical shall be the Contractor's responsibility to design, supply, and install at no additional cost or time to the Government. VA approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.	A	GOV														
		1.4F	Prior to submitting shop drawings for approval, Contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed contract documents and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.	A	GOV														
		1.4G	Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together. Coordinate and properly integrate materials and equipment to provide a completely compatible and efficient installation.	A	GOV														
		1.4H	Coordination/Shop Drawings:	A	GOV														
		1.4H.1	Submit complete consolidated and coordinated shop drawings for all new systems, and for existing systems that are in the same areas.	A	GOV														
		1.4H.2	The coordination/shop drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8-inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show locations and adequate clearance for all equipment, piping, valves, control panels and other items. Show the access means for all items requiring access for operations and maintenance. Provide detailed coordination/shop drawings of all piping and duct systems. The drawings should include all lockout/tagout points for all energy/hazard sources for each piece of equipment. Coordinate lockout/tagout procedures and practices with local VA requirements.	A	GOV														

			PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
			LOCATION:	Albuquerque, NM																	
			PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:		36C25819D0036									
			CONTRACTOR:							TASK ORDER NO:		36C25819N0403									
					REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES					Remarks
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		1.4H.3	Do not install equipment foundations, equipment or piping until coordination/shop drawings have been approved.	A	GOV													
		1.4H.4	In addition, for HVAC systems, provide details of the following:	A	GOV													
		1.4H.4a	Mechanical equipment rooms.	A	GOV													
		1.4H.4b	Interstitial space.	A	GOV													
		1.4H.4c	Hangers, inserts, supports, and bracing.	A	GOV													
		1.4H.4d	Pipe sleeves.	A	GOV													
		1.4H.4e	Duct or equipment penetrations of floors, walls, ceilings, or roofs.	A	GOV													
		1.4I	Manufacturer's Literature and Data: Include full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity. Submit under the pertinent section rather than under this section.	A	GOV													
		1.4I.1	Submit belt drive with the driven equipment. Submit selection data for specific drives when requested by the COR.	A	GOV													
		1.4I.2	Submit electric motor data and variable speed drive data with the driven equipment.	A	GOV													
		1.4I.3	Equipment and materials identification.	A	GOV													
		1.4I.4	Fire-stopping materials.	A	GOV													
		1.4I.5	Hangers, inserts, supports and bracing. Provide complete stress analysis for variable spring and constant support hangers.	A	GOV													
		1.4I.6	Wall, floor, and ceiling plates.	A	GOV													
		1.4J	Rigging Plan: Provide documentation of the capacity and weight of the rigging and equipment intended to be used. The plan shall include the path of travel of the load, the staging area and intended access, and qualifications of the operator and signal person.	A	GOV													
		1.4K	HVAC Maintenance Data and Operating Instructions:	A	GOV													
		1.4K.1	Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment.	A	GOV													
		1.4K.2	Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:	A	GOV													
		1.4K.2a	Include complete list indicating all components of the systems.	A	GOV													
		1.4K.2b	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV													
		1.4K.2c	Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.	A	GOV													
		1.4K.3	Provide a listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment. Include in the listing belts for equipment: Belt manufacturer, model number, size, and style, and distinguished whether of multiple belt sets.	A	GOV													
		1.4L	Provide copies of approved HVAC equipment submittals to the TAB and Commissioning Subcontractor.	A	GOV													

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4M	Completed System Readiness Checklist provided by the Commissioning Agent and completed by the Contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV																
		1.4N	Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV																
Spec Section 23 05 12 General Motor Requirements for HVAC and Steam Generation Equipment																					
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT", with applicable paragraph identification.	A	GOV																
		1.4C	Submit motor submittals with driven equipment.	A	GOV																
		1.4D	Shop Drawings:	A	GOV																
		1.4D.1	Provide documentation to demonstrate compliance with contract documents.	A	GOV																
		1.4D.2	Motor nameplate information shall be submitted including electrical ratings, efficiency, bearing data, power factor, frame size, dimensions, mounting details, materials, horsepower, voltage, phase, speed (RPM), enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.	A	GOV																
		1.4E	Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV																
		1.4F	Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:	A	GOV																
		1.4F.1	Include complete list indicating all components of the systems.	A	GOV																
		1.4F.2	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV																
		1.4F.3	Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.	A	GOV																
		1.4G	Certification: Two weeks prior to final inspection, unless otherwise noted, certification shall be submitted to the COR stating that the motors have been properly applied, installed, adjusted, lubricated, and tested.	A	GOV																
		1.4H	Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV																
		1.4I	Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV																

PROJECT:	Repair-Replace Elevators in B-41			SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM			
PROJECT NO:	501-19-101 | ACG: 19-262	CONTRACT NO:	36C25819D0036	
CONTRACTOR:		TASK ORDER NO:	36C25819N0403	

				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
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Spec Section 23 05 41 Noise and Vibration Control For HVAC Piping and Equipment																		
		1.4A	Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													
		1.4B	Manufacturer's Literature and Data:	A	GOV													
		1.4B.1	Vibration isolators:	A	GOV													
		1.4B.1a	Floor mountings	A	GOV													
		1.4B.1b	Hangers	A	GOV													
		1.4B.1c	Snubbers	A	GOV													
		1.4B.1d	Thrust restraints	A	GOV													
		1.4B.2	Bases.	A	GOV													
		1.4B.3	Seismic restraint provisions and bolting.	A	GOV													
		1.4B.4	Acoustical enclosures.	A	GOV													
		1.4C	Isolator manufacturer shall furnish with submittal load calculations for selection of isolators, including supplemental bases, based on lowest operating speed of equipment supported.	A	GOV													
		1.4D	Seismic Requirements: Submittals are required for all equipment anchors, supports and seismic restraints. Submittals shall include weights, dimensions, standard connections, and manufacturer's certification that all specified equipment will withstand seismic Lateral Force requirements as shown on drawings.	A	GOV													
Spec Section 23 05 93 Testing, Adjusting, and Balancing for HVAC																		
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													
		1.4B	Submit names and qualifications of TAB agency and TAB specialists within 60 days after the notice to proceed. Submit information on three recently completed projects and a list of proposed test equipment.	A	GOV													
		1.4C	For use by the Resident Engineer staff, submit one complete set of applicable AABC, NEBB, or TABB publications that will be the basis of TAB work.	A	GOV													
		1.4D	Submit Following for Review and Approval:	A	GOV													
		1.4D.1	Design Review Report within 90 days for conventional design projects and within 60 days for design-build projects after the system layout on air and water side is completed by the Contractor.	A	GOV													
		1.4D.2	Systems inspection report on equipment and installation for conformance with design.	A	GOV													
		1.4D.3	Duct Air Leakage Test Report.	A	GOV													
		1.4D.4	Systems Readiness Report.	A	GOV													
		1.4D.5	Intermediate and Final TAB reports covering flow balance and adjustments, performance tests, vibration tests and sound tests.	A	GOV													
		1.4D.6	Include in final reports uncorrected installation deficiencies noted during TAB and applicable explanatory comments on test results that differ from design requirements.	A	GOV													
		1.4D.7	Include in each report the critical path for each balanced branch (air and hydronic. Every branch shall have at least one terminal device damper 100% open.	A	GOV													

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
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		1.4E	Prior to request for Final or Partial Final inspection, submit completed Test and Balance report for the area with noted critical paths.	A	GOV																
Spec Section 23 07 11 HVAC and Boiler Plant Insulation																					
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA																
		1.4B	Shop Drawings:	A	GOV																
		1.4B.1	All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM, federal and military specifications.	A	GOV																
		1.4B.1a	Insulation materials: Specify each type used and state surface burning characteristics.	A	GOV																
		1.4B.1b	Insulation facings and jackets: Each type used. Make it clear that white finish will be furnished for exposed ductwork, casings and equipment.	A	GOV																
		1.4B.1c	Insulation accessory materials: Each type used.	A	GOV																
		1.4B.1d	Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation.	A	GOV																
		1.4B.1e	Refer to applicable specification paragraph numbers for coordination.	A	GOV																
Spec Section 23 08 00 Commissioning of HVAC System																					
		1.5A	The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.	NA	NA																
		1.5B	The commissioning process requires Submittal review simultaneously with engineering review.	A	GOV																
Spec Section 23 09 23 Direct-Digital Control System For HVAC																					
		1.7A	Submit shop drawings in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.7B	Manufacturer's literature and data for all components including the following:	A	GOV																
		1.7B.1	A wiring diagram for each type of input device and output device including DDC controllers, modems, repeaters, etc. Diagram shall show how the device is wired and powered, showing typical connections at the digital controllers and each power supply, as well as the device itself. Show for all field connected devices, including but not limited to, control relays, motor starters, electric or electronic actuators, and temperature pressure, flow and humidity sensors and transmitters.	A	GOV																
		1.7B.2	A diagram of each terminal strip, including digital controller terminal strips, terminal strip location, termination numbers and the associated point names.	A	GOV																
		1.7B.3	Control dampers and control valves schedule, including the size and pressure drop.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.7B.4	Control air-supply components, and computations for sizing compressors, receivers and main air- piping, if pneumatic controls are furnished.	A	GOV															
		1.7B.5	Catalog cut sheets of all equipment used. This includes, but is not limited to, software (by manufacturer and by third parties), DDC controllers, panels, peripherals, airflow measuring stations and associated components, and auxiliary control devices such as sensors, actuators, and control dampers. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted. Each submitted piece of literature and drawings should clearly reference the specification and/or drawings that it supposed to represent.	A	GOV															
		1.7B.6	Sequence of operations for each HVAC system and the associated control diagrams. Equipment and control labels shall correspond to those shown on the drawings.	A	GOV															
		1.7B.7	Color prints of proposed graphics with a list of points for display.	A	GOV															
		1.7B.8	Furnish a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet- compliant device.	A	GOV															
		1.7B.9	Schematic wiring diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show all interface wiring to the control system.	A	GOV															
		1.7B.10	An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number.	A	GOV															
		1.7B.11	Riser diagrams of wiring between central control unit and all control panels.	A	GOV															
		1.7B.12	Scaled plan drawings showing routing of LAN and locations of control panels, controllers, routers, gateways, ECC, and larger controlled devices.	A	GOV															
		1.7B.13	Construction details for all installed conduit, cabling, raceway, cabinets, and similar. Construction details of all penetrations and their protection.	A	GOV															
		1.7B.14	Quantities of submitted items may be reviewed but are the responsibility of the contractor administered by this Section of the technical specifications.	A	GOV															
		1.7C	Product Certificates: Compliance with Article, QUALITY ASSURANCE.	A	GOV															
		1.7D	Licenses: Provide licenses for all software residing on and used by the Controls Systems and transfer these licenses to the Owner prior to completion.	A	GOV															
		1.7E	As Built Control Drawings:	A	GOV															
		1.7E.1	Furnish three (3) copies of as-built drawings for each control system. The documents shall be submitted for approval prior to final completion.	A	GOV															
		1.7E.2	Furnish one (1) stick set of applicable control system prints for each mechanical system for wall mounting. The documents shall be submitted for approval prior to final completion.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code				
		1.7E.3	Furnish one (1) CD-ROM in CAD DWG and/or .DXF format for the drawings noted in subparagraphs above.	A	GOV																
		1.7F	Operation and Maintenance (O/M) Manuals):	A	GOV																
		1.7F.1	Submit in accordance with Article, INSTRUCTIONS, in Specification Section 01 00 00, GENERAL REQUIREMENTS.	A	GOV																
		1.7F.2	Include the following documentation:	A	GOV																
		1.7F.2a	General description and specifications for all components, including logging on/off, alarm handling, producing trend reports, overriding computer control, and changing set points and other variables.	A	GOV																
		1.7F.2b	Detailed illustrations of all the control systems specified for ease of maintenance and repair/replacement procedures, and complete calibration procedures.	A	GOV																
		1.7F.2c	One copy of the final version of all software provided including operating systems, programming language, operator workstation software, and graphics software.	A	GOV																
		1.7F.2d	Complete troubleshooting procedures and guidelines for all systems.	A	GOV																
		1.7F.2e	Complete operating instructions for all systems.	A	GOV																
		1.7F.2f	Recommended preventive maintenance procedures for all system components including a schedule of tasks for inspection, cleaning and calibration. Provide a list of recommended spare parts needed to minimize downtime.	A	GOV																
		1.7F.2g	Training Manuals: Submit the course outline and training material to the Owner for approval three (3) weeks prior to the training to VA facility personnel. These persons will be responsible for maintaining and the operation of the control systems, including programming. The Owner reserves the right to modify any or all of the course outline and training material.	A	GOV																
		1.7F.2h	Licenses, guaranty, and other pertaining documents for all equipment and systems.	A	GOV																
		1.7G	Submit Performance Report to COR prior to final inspection.	A	GOV																
Spec Section 23 22 13 Steam and Condensate Heating Piping																					
		1.4A	Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.4B	Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 22 13, STEAM AND CONDENSATE HEATING PIPING", with applicable paragraph identification.	A	GOV																
		1.4C	Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.	A	GOV																
		1.4C.1	Pipe and equipment supports. Submit calculations for variable spring and constant support hangers.	A	GOV																
		1.4C.2	Pipe and tubing, with specification, class or type, and schedule.	A	GOV																
		1.4C.3	Pipe fittings, including miscellaneous adapters and special fittings.	A	GOV																
		1.4C.4	Flanges, gaskets, and bolting.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks	
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		1.4C.5	Valves of all types.	A	GOV															
		1.4C.6	Strainers.	A	GOV															
		1.4C.7	Pipe alignment guides.	A	GOV															
		1.4C.8	Flexible ball joints: Catalog sheets, performance charts, schematic drawings, specifications and installation instructions.	A	GOV															
		1.4C.9	All specified steam system components.	A	GOV															
		1.4C.10	Gauges.	A	GOV															
		1.4C.11	Thermometers and test wells.	A	GOV															
		1.4C.12	Seismic bracing details for piping.	A	GOV															
		1.4D	Coordination Drawings: Refer to paragraph, SUBMITTALS of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.	A	GOV															
		1.4E	As-Built Piping Diagrams: Provide drawing as follows for steam and steam condensate piping and other central plant equipment.	A	GOV															
		1.4E.1	One wall-mounted stick file for prints. Mount stick file in the chiller plant or adjacent control room along with control diagram stick file.	A	GOV															
		1.4E.2	One set of reproducible drawings.	A	GOV															
		1.4F	Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:	A	GOV															
		1.4F.1	Include complete list indicating all components of the systems.	A	GOV															
		1.4F.2	Include complete diagrams of the internal wiring for each item of equipment.	A	GOV															
		1.4F.3	Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.	A	GOV															
		1.4G	Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV															
		1.4H	Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.	A	GOV															
Spec Section 23 23 00 Refrigerant Piping																				
		1.4A	Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA															
		1.4B	Shop Drawings:	A	GOV															
		1.4B.1	Complete information for components noted, including valves and refrigerant piping accessories, clearly presented, shall be included to determine compliance with drawings and specifications for components noted below:	A	GOV															
		1.4B.1a	Tubing and fittings	A	GOV															
		1.4B.1b	Valves	A	GOV															
		1.4B.1c	Strainers	A	GOV															
		1.4B.1d	Moisture-liquid indicators	A	GOV															
		1.4B.1e	Filter-driers	A	GOV															
		1.4B.1f	Flexible metal hose	A	GOV															
		1.4B.1g	Liquid-suction interchanges	A	GOV															
		1.4B.1h	Oil separators (when specified)	A	GOV															
		1.4B.1i	Gages	A	GOV															

PROJECT:	Repair-Replace Elevators in B-41																		SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM																		
PROJECT NO:	501-19-101 | ACG: 19-262							CONTRACT NO:	36C25819D0036										
CONTRACTOR:								TASK ORDER NO:	36C25819N0403										

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		1.4B.1j	Pipe and equipment supports	A	GOV													
		1.4B.1k	Refrigerant and oil	A	GOV													
		1.4B.1l	Pipe/conduit roof penetration cover	A	GOV													
		1.4B.1m	Soldering and brazing materials	A	GOV													
		1.4B.2	Layout of refrigerant piping and accessories, including flow capacities, valves locations, and oil traps slopes of horizontal runs, floor/wall penetrations, and equipment connection details.	A	GOV													
		1.4C	Certification: Copies of certificates for welding procedure, performance qualification record and list of welders' names and symbols.	A	GOV													
		1.4D	See chart in the specification.	A	GOV													
Spec Section 23 31 00 HVAC Ducts and Casings																		
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													
		1.4B	Manufacturer's Literature and Data:	A	GOV													
		1.4B.1	Rectangular ducts:	A	GOV													
		1.4B.1a	Schedules of duct systems, materials and selected SMACNA construction alternatives for joints, sealing, gage, and reinforcement.	A	GOV													
		1.4B.1b	Duct liner.	A	GOV													
		1.4B.1c	Sealants and gaskets.	A	GOV													
		1.4B.1d	Access doors.	A	GOV													
		1.4B.2	Round and flat oval duct construction details:	A	GOV													
		1.4B.2a	Manufacturer's details for duct fittings.	A	GOV													
		1.4B.2b	Duct liner.	A	GOV													
		1.4B.2c	Sealants and gaskets.	A	GOV													
		1.4B.2d	Access sections.	A	GOV													
		1.4B.2e	Installation instructions.	A	GOV													
		1.4B.3	Volume dampers, back draft dampers.	A	GOV													
		1.4B.4	Upper hanger attachments.	A	GOV													
		1.4B.5	Fire dampers, fire doors, and smoke dampers with installation instructions.	A	GOV													
		1.4B.6	Sound attenuators, including pressure drop and acoustic performance.	A	GOV													
		1.4B.7	Flexible ducts and clamps, with manufacturer's installation instructions.	A	GOV													
		1.4B.8	Flexible connections.	A	GOV													
		1.4B.9	Instrument test fittings.	A	GOV													
		1.4B.10	Details and design analysis of alternate or optional duct systems.	A	GOV													
		1.4B.11	COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.	A	GOV													
		1.4C	Coordination Drawings: Refer to article, SUBMITTALS, in Section 23 05 11 – Common Work Results for HVAC and Steam Generation.	A	GOV													
Spec Section 23 34 00 HVAC Fans																		
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA													
		1.4B	Manufacturers Literature and Data:	A	GOV													
		1.4B.1	Fan sections, motors, and drives.	A	GOV													
		1.4B.2	Centrifugal fans, motors, drives, accessories, and coatings.	A	GOV													
		1.4B.2a	In-line centrifugal fans.	A	GOV													

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4B.2b	Tubular Centrifugal Fans.	A	GOV															
		1.4B.2c	Industrial fans.	A	GOV															
		1.4B.3	Propeller fans.	A	GOV															
		1.4C	Certified Sound power levels for each fan.	A	GOV															
		1.4D	Motor ratings types, electrical characteristics, and accessories.	A	GOV															
		1.4E	Roof curbs.	A	GOV															
		1.4F	Belt guards.	A	GOV															
		1.4G	Maintenance and Operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.	A	GOV															
		1.4H	Certified fan performance curves for each fan showing cubic feet per minute (CFM) versus static pressure, efficiency, and horsepower for design point of operation.	A	GOV															
Spec Section 23 36 00 Air Terminal Units																				
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA															
		1.4B	Manufacturer's Literature and Data:	A	GOV															
		1.4B.1	Air Terminal Units: Submit test data.	A	GOV															
		1.4B.2	Air flow control valves.	A	GOV															
		1.4C	Samples: Provide one typical air terminal unit for approval by the COR. This unit will be returned to the Contractor after all similar units have been shipped and deemed acceptable at the job site.	A	GOV															
		1.4D	Certificates:	A	GOV															
		1.4D.1	Compliance with Article, QUALITY ASSURANCE.	A	GOV															
		1.4D.2	Compliance with specified standards.	A	GOV															
		1.4E	Operation and Maintenance Manuals: Submit in accordance with paragraph, INSTRUCTIONS, in Section 01 00 00, GENERAL REQUIREMENTS.	A	GOV															
Spec Section 23 37 00 Air Outlets and Inlets																				
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA															
		1.4B	Manufacturer's Literature and Data:	A	GOV															
		1.4B.1	Air intake/exhaust hoods.	A	GOV															
		1.4B.2	Diffusers, registers, grilles and accessories.	A	GOV															
		1.4C	Coordination Drawings: Refer to article, SUBMITTALS, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.	A	GOV															
Spec Section 23 40 00 HVAC Air Cleaning Devices																				
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA															
		1.4B	Manufacturer's Literature and Data:	A	GOV															
		1.4B.1	Extended surface filters.	A	GOV															
		1.4B.2	Holding frames. Identify locations.	A	GOV															
		1.4B.3	Side access housings. Identify locations, verify insulated doors.	A	GOV															
		1.4B.4	Magnehelic gages.	A	GOV															
		1.4C	Air Filter performance reports.	A	GOV															
		1.4D	Suppliers warranty.	A	GOV															
Spec Section 23 73 00 Indoor Central-Station Air-Handling Units																				

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4A	The contractor shall, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish a complete submission for all air handling units covered in the project. The submission shall include all information listed below. Partial and incomplete submissions shall be rejected without reviews.	NA	NA																
		1.4B	Manufacturer's Literature and Data:	A	GOV																
		1.4B.1	Submittals for AHUs shall include fans, drives, motors, coils, sound attenuators, mixing box with outside/return air dampers, filter housings, blender sections, and all other related accessories. The contractor shall provide custom drawings showing total air handling unit assembly including dimensions, operating weight, access sections, flexible connections, door swings, controls penetrations, electrical disconnect, lights, duplex receptacles, switches, wiring, utility connection points, unit support system, vibration isolators, drain pan, pressure drops through each component (filter, coil etc).	A	GOV																
		1.4B.2	Submittal drawings of section or component only will not be acceptable. Contractor shall also submit performance data including performance test results, charts, curves or certified computer selection data; data sheets; fabrication and insulation details. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements. This data shall be submitted in hard copies and in electronic version compatible to AutoCAD version used by the VA at the time of submission.	A	GOV																
		1.4B.3	Submit sound power levels in each octave band for the inlet and discharge of the fan and at entrance and discharge of AHUs at scheduled conditions. In absence of sound power ratings refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.	A	GOV																
		1.4B.4	Provide fan curves showing Cubic Feet per Minute, static pressure, efficiency, and horsepower for design point of operation and at maximum design Cubic Feet per Minute.	A	GOV																
		1.4B.5	Submit total fan static pressure, external static pressure, for AHU including total, inlet and discharge pressures, and itemized specified internal losses and unspecified internal losses. Refer to air handling unit schedule on drawings.	A	GOV																
		1.4C	Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS. Include instructions for lubrication, filter replacement, motor and drive replacement, spare part lists, and wiring diagrams.	A	GOV																
		1.4D	Submit written test procedures two weeks prior to factory testing. Submit written results of factory tests for approval prior to shipping.	A	GOV																
		1.4E	Submit shipping information that clearly indicates how the units will be shipped in compliance with the descriptions below.	A	GOV																
		1.4E.1	Units shall be shipped in one (1) piece where possible and in shrink wrapping to protect the unit from dirt, moisture and/or road salt.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036											
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403											
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks	
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		1.4E.2	If not shipped in one (1) piece, provide manufacturer approved shipping splits where required for installation or to meet shipping and/or job site rigging requirements in modular sections. Indicate clearly that the shipping splits shown in the submittals have been verified to accommodate the construction constraints for rigging as required to complete installation and removal of any section for replacement through available access without adversely affecting other sections.	A	GOV															
		1.4E.3	If shipping splits are provided, each component shall be individually shrink wrapped to protect the unit and all necessary hardware (e.g. bolts, gaskets etc.) will be included to assemble unit on site (see section 2.1.A4).	A	GOV															
		1.4E.4	Lifting lugs will be provided to facilitate rigging on shipping splits and joining of segments. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements.	A	GOV															
Spec Section 23 81 00 Decentralized Unitary HVAC Equipment				**A, GOV**																
		1.4A	Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES	NA	NA															
		1.4B	Manufacturer's literature and data:	A	GOV															
		1.4B.1	Sufficient information, including capacities, pressure drops, and piping connections clearly presented, shall be included to determine compliance with drawings and specifications for units noted below:	A	GOV															
		1.4B.1a	Unitary air conditioners:	A	GOV															
		1.4B.1a.1	Self-contained units	A	GOV															
		1.4B.1a.2	Split systems	A	GOV															
		1.4B.1a.3	Rooftop units	A	GOV															
		1.4B.2	Unit Dimensions required clearances, operating weights accessories and start-up instructions.	A	GOV															
		1.4B.3	Electrical requirements, wiring diagrams, interlocking and control wiring showing factory installed and portions to be field installed.	A	GOV															
		1.4B.4	Mounting and flashing of the roof curb to the roofing structure with coordinating requirements for the roof membrane system.	A	GOV															
		1.4C	Certification: Submit proof of specified ARI Certification.	A	GOV															
		1.4D	Performance Rating: Submit catalog selection data showing equipment ratings and compliance with required sensible-to-heat-ratio, energy efficiency ratio (EER), and coefficient of performance (COP).	A	GOV															
		1.4E	Operating and Maintenance Manual: Submit three copies of Operating and Maintenance manual to Resident Engineer three weeks prior to final inspection.	A	GOV															
		1.4F	Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
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Spec Section 23 82 16 Air Coils																					
		1.4A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.	NA	NA																
		1.4B	Manufacturer's Literature and Data for Heating and Cooling Coils: Submit type, size, arrangements and performance details. Present application ratings in the form of tables, charts or curves.	A	GOV																
		1.4C	Provide installation, operating and maintenance instructions.	A	GOV																
		1.4D	Certification Compliance: Evidence of listing in current ARI Directory of Certified Applied Air Conditioning Products.	A	GOV																
		1.4E	Coils may be submitted with Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.	A	GOV																
		1.4F	Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.	A	GOV																
Spec Section 26 05 11 Requirements For Electrical Installations																					
		1.12A	Submit to the COR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.12B	The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.	A	GOV																
		1.12C	All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.	A	GOV																
		1.12D	Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.	A	GOV																
		1.12D.1	Mark the submittals, "SUBMITTED UNDER SECTION".	A	GOV																
		1.12D.2	Submittals shall be marked to show specification reference including the section and paragraph numbers.	A	GOV																
		1.12D.3	Submit each section separately.	A	GOV																
		1.12E	The submittals shall include the following:	A	GOV																
		1.12E.1	Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code				
		1.12E.2	Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.	A	GOV																
		1.12E.3	Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.	A	GOV																
		1.12E.4	Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.	A	GOV																
		1.12F	Maintenance and Operation Manuals:	A	GOV																
		1.12F.1	Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.	A	GOV																
		1.12F.2	Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.	A	GOV																
		1.12F.3	Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.	A	GOV																
		1.12F.4	The manuals shall include:	A	GOV																
		1.12F.4a	Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.	A	GOV																
		1.12F.4b	A control sequence describing start-up, operation, and shutdown.	A	GOV																
		1.12F.4c	Description of the function of each principal item of equipment.	A	GOV																
		1.12F.4d	Installation instructions.	A	GOV																
		1.12F.4e	Safety precautions for operation and maintenance.	A	GOV																
		1.12F.4f	Diagrams and illustrations.	A	GOV																
		1.12F.4g	Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.	A	GOV																
		1.12F.4h	Performance data.	A	GOV																
		1.12F.4i	Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.	A	GOV																
		1.12F.4j	List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.	A	GOV																

PROJECT:	Repair-Replace Elevators in B-41																			SUBMITTAL REGISTER	
LOCATION:	Albuquerque, NM																				
PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036														
CONTRACTOR:						TASK ORDER NO:	36C25819N0403														
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES					Remarks	
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code				
		1.12G	Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.	A	GOV																
Spec Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Submit the following data for approval:	A	GOV																
		1.4A.1b.1	Electrical ratings and insulation type for each conductor and cable.	A	GOV																
		1.4A.1b.2	Splicing materials and pulling lubricant.	A	GOV																
		1.4A.2	Certifications: Two weeks prior to final inspection, submit the following:	A	GOV																
		1.4A.2a	Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.	A	GOV																
		1.4A.2b	Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.	A	GOV																
Spec Section 26 05 26 Grounding and Bonding For Electrical Systems																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.	A	GOV																
		1.4A.2	Test Reports:	A	GOV																
		1.4A.2a	Two weeks prior to the final inspection, submit ground resistance field test reports to the COR.	A	GOV																
		1.4A.3	Certifications:	A	GOV																
		1.4A.3a	Certification by the Contractor that the grounding equipment has been properly installed and tested.	A	GOV																
Spec Section 26 05 33 Raceway and Boxes For Electrical Systems																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Size and location of main feeders.	A	GOV																
		1.4A.1b	Size and location of panels and pull-boxes.	A	GOV																
		1.4A.1c	Layout of required conduit penetrations through structural elements.	A	GOV																
		1.4A.1d	Submit the following data for approval:	A	GOV																
		1.4A.1d.1	Raceway types and sizes.	A	GOV																
		1.4A.1d.2	Conduit bodies, connectors and fittings.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks	
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code			
		1.4A.1d.3	Junction and pull boxes, types and sizes	A	GOV															
		1.4A.2	Certifications: Two weeks prior to final inspection, submit the following:	A	GOV															
		1.4A.2a	Certification by the manufacturer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.	A	GOV															
		1.4A.2b	Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.	A	GOV															
Spec Section 26 05 73 Overcurrent Protective Device Coordination Study																				
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA															
		1.4A.1	Product data on the software program to be used for the study. Software shall be in mainstream use in the industry, shall provide device settings and ratings, and shall show selective coordination by time-current drawings.	A	GOV															
		1.4A.2	Complete study as described in paragraph 1.6. Submittal of the study shall be well-coordinated with submittals of the shop drawings for equipment in related specification sections.	A	GOV															
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV															
		1.4A.3a	Certification by the Contractor that the overcurrent protective devices have been set in accordance with the approved study.	A	GOV															
Spec Section 26 22 00 Low-Voltage Transformers																				
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA															
		1.4A.1	Shop Drawings:	A	GOV															
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV															
		1.4A.1b	Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, temperature rise, wiring and connection diagrams, plan, front, side, and rear elevations, accessories, and device nameplate data.	A	GOV															
		1.4A.1c	Certification from the manufacturer that representative transformers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.	A	GOV															
		1.4A.2	Manuals:	A	GOV															
		1.4A.2a	Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets and wiring diagrams.	A	GOV															
		1.4A.2a .1	Schematic signal and control diagrams, with all terminals identified, matching terminal identification in the transformers.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code				
		1.4A.2a .2	Include information for testing, repair, troubleshooting, assembly, disassembly, and factory recommended/required periodic maintenance procedures and frequency.	A	GOV																
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV																
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV																
		1.4A.3a	Certification by the manufacturer that the transformers conform to the requirements of the drawings and specifications.	A	GOV																
		1.4A.3b	Certification by the Contractor that the transformers have been properly installed, adjusted, and tested.	A	GOV																
Spec Section 26 24 16 Panelboards																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.	A	GOV																
		1.4A.1c	Certification from the manufacturer that a representative panelboard has been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.	A	GOV																
		1.4A.2	Manuals:	A	GOV																
		1.4A.2a	Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.	A	GOV																
		1.4A.2a .1	Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.	A	GOV																
		1.4A.2a .2	Include information for testing, repair, troubleshooting, assembly, and disassembly.	A	GOV																
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV																
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV																
		1.4A.3a	Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.	A	GOV																
		1.4A.3b	Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.	A	GOV																
Spec Section 26 27 26 Wiring Devices																					

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
Activity #	Transmittal #	Paragraph #	Description	A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code				
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Include electrical ratings, dimensions, mounting details, construction materials, grade, and termination information.	A	GOV																
		1.4A.2	Manuals:	A	GOV																
		1.4A.2a	Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and information for ordering replacement parts.	A	GOV																
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV																
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV																
		1.4A.3a	Certification by the manufacturer that the wiring devices conform to the requirements of the drawings and specifications.	A	GOV																
		1.4A.3b	Certification by the Contractor that the wiring devices have been properly installed and adjusted.	A	GOV																
Spec Section 26 29 11 Motor Controllers																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Include electrical ratings, dimensions, weights, mounting details, materials, overcurrent protection devices, overload relays, sizes of enclosures, wiring diagrams, starting characteristics, interlocking, and accessories.	A	GOV																
		1.4A.1c	Certification from the manufacturer that representative motor controllers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.	A	GOV																
		1.4A.2	Manuals:	A	GOV																
		1.4A.2a	Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.	A	GOV																
		1.4A.2a .1	Wiring diagrams shall have their terminals identified to facilitate installation, maintenance, and operation.	A	GOV																
		1.4A.2a .2	Wiring diagrams shall indicate internal wiring for each item of equipment and interconnections between the items of equipment.	A	GOV																
		1.4A.2a .3	Elementary schematic diagrams shall be provided for clarity of operation.	A	GOV																

PROJECT:	Repair-Replace Elevators in B-41					SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM					
PROJECT NO:	501-19-101 | ACG: 19-262	CONTRACT NO:	36C25819D0036			
CONTRACTOR:		TASK ORDER NO:	36C25819N0403			

Activity #	Transmittal #	Paragraph #	Description	REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
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		1.4A.2a .4	Include the catalog numbers for the correct sizes of overload relays for the motor controllers.	A	GOV													
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV													
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV													
		1.4A.3a	Certification by the manufacturer that the motor controllers conform to the requirements of the drawings and specifications.	A	GOV													
		1.4A.3b	Certification by the Contractor that the motor controllers have been properly installed, adjusted, and tested.	A	GOV													
Spec Section 26 29 21 Enclosed Switches and Circuit Breakers																		
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA													
		1.4A.1	Shop Drawings:	A	GOV													
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV													
		1.4A.1b	Submit the following data for approval:	A	GOV													
		1.4A.1b .1	Electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, fuses, circuit breakers, wiring and connection diagrams, accessories, and device nameplate data.	A	GOV													
		1.4A.1c	Certification from the manufacturer that representative enclosed switches and circuit breakers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.	A	GOV													
		1.4A.2	Manuals:	A	GOV													
		1.4A.2a	Submit complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering fuses, circuit breakers, and replacement parts.	A	GOV													
		1.4A.2a .1	Include schematic diagrams, with all terminals identified, matching terminal identification in the enclosed switches and circuit breakers.	A	GOV													
		1.4A.2a .2	Include information for testing, repair, troubleshooting, assembly, and disassembly.	A	GOV													
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV													
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV													
		1.4A.3a	Certification by the manufacturer that the enclosed switches and circuit breakers conform to the requirements of the drawings and specifications.	A	GOV													
		1.4A.3b	Certification by the Contractor that the enclosed switches and circuit breakers have been properly installed, adjusted, and tested.	A	GOV													
Spec Section 26 43 13 Surge Protective Devices																		

			PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
			LOCATION:	Albuquerque, NM																	
			PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
			CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
					REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks		
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		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit sufficient information to demonstrate compliance with drawings and specifications.	A	GOV																
		1.4A.1b	Include electrical ratings and device nameplate data.	A	GOV																
		1.4A.2	Manuals:	A	GOV																
		1.4A.2a	Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.	A	GOV																
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV																
		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV																
		1.4A.3a	Certification by the manufacturer that the SPD conforms to the requirements of the drawings and specifications.	A	GOV																
		1.4A.3b	Certification by the Contractor that the SPD has been properly installed.	A	GOV																
Spec Section 26 51 00 Interior Lighting																					
		1.4A	Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:	NA	NA																
		1.4A.1	Shop Drawings:	A	GOV																
		1.4A.1a	Submit the following information for each type of lighting fixture designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of lighting fixture designation.	A	GOV																
		1.4A.1b	Material and construction details, include information on housing and optics system.	A	GOV																
		1.4A.1c	Physical dimensions and description.	A	GOV																
		1.4A.1d	Wiring schematic and connection diagram.	A	GOV																
		1.4A.1e	Installation details.	A	GOV																
		1.4A.1f	Energy efficiency data.	A	GOV																
		1.4A.1g	Photometric data based on laboratory tests complying with IES Lighting Measurements testing and calculation guides.	A	GOV																
		1.4A.1h	Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours), and color temperature (degrees Kelvin).	A	GOV																
		1.4A.1i	For LED lighting fixtures, submit US DOE LED Lighting Facts label, and IES L70 rated life	A	GOV																
		1.4A.2	Manuals:	A	GOV																
		1.4A.2a	Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.	A	GOV																
		1.4A.2b	If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																		SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																			
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036												
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				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES							Remarks	
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		1.4A.3	Certifications: Two weeks prior to final inspection, submit the following.	A	GOV																	
		1.4A.3a	Certification by the Contractor that the interior lighting systems have been properly installed and tested.	A	GOV																	
Spec Section 27 05 11 Requirements for Communications Installations																						
		1.7A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES	NA	NA																	
		1.7B	Provide parts list including quantity of spare parts.	A	GOV																	
		1.7C	Provide manufacturer product information. Government reserves the right to require a list of installations where products have been in operation.	A	GOV																	
		1.7D	Provide coordination drawings for all systems/equipment/devices, coordinate with all other trades, sections of corridor mechanical, plumbing, electrical, cable tray drawings shall be submitted for approval.	A	GOV																	
		1.7E	Provide Source Quality Control Submittal:	A	GOV																	
		1.7E.1	Submit written certification from OEM indicating that proposed supervisor of installation and proposed provider of warranty maintenance are authorized representatives of OEM. Include individual's legal name, contact information and OEM credentials in certification.	A	GOV																	
		1.7E.2	Submit written certification from OEM that wiring and connection diagrams meet Government Life Safety Guidelines, NFPA, NEC, NRTL, these specifications, and Joint Commission requirements and instructions, requirements, recommendations, and guidance set forth by OEM for the proper performance of system.	A	GOV																	
		1.7E.3	Pre-acceptance Certification: Certification in accordance with procedure outlined in Section 01 00 00, GENERAL REQUIREMENTS and specific Division 27 qualification documentation.	A	GOV																	
		1.7F	Installer Qualifications: Submit three installations of similar size and complexity furnished and installed by installer; include:	A	GOV																	
		1.7F.1	Installation location and name.	A	GOV																	
		1.7F.2	Owner's name and contact information including, address, telephone and email.	A	GOV																	
		1.7F.3	Date of project start and date of final acceptance.	A	GOV																	
		1.7F.4	System project number.	A	GOV																	
		1.7F.5	Three-paragraph description of each system related to this project; include function, operation, and installation.	A	GOV																	
		1.7G	Provide delegated design submittals (e.g. seismic support design).	A	GOV																	
		1.7H	Submittals are required for all equipment anchors and supports. Include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or conduit. Anchors and supports to resist seismic load based on seismic design categories per section 4.0 of VA seismic design requirements H-18-8 dated August, 2013.	A	GOV																	
		1.7I	Test Equipment List:	A	GOV																	
		1.7I.1	Supply test equipment of accuracy better than parameters to be tested.	A	GOV																	

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.7I.2	Submit test equipment list including make and model number:	A	GOV															
		1.7I.2a	ANSI/TIA-1152 CAT 6A class EA twisted pair cabling test instrument.	A	GOV															
		1.7I.2b	Fiber optic insertion loss power meter with light source.	A	GOV															
		1.7I.2c	Optical time domain reflectometer (OTDR).	A	GOV															
		1.7I.2d	Volt-Ohm meter.	A	GOV															
		1.7I.2e	Digital camera.	A	GOV															
		1.7I.3	Supply only test equipment with a calibration tag from Government-accepted calibration service dated not more than 12 months prior to test.	A	GOV															
		1.7I.4	Provide sample test and evaluation reports.	A	GOV															
		1.7J	Submittal Drawings:	A	GOV															
		1.7J.1	Telecommunications Space Plans/Elevations: Provide enlarged floor plans of telecommunication spaces indicating layout of equipment and devices, including receptacles and grounding provisions. Submit detailed plan views and elevations of telecommunication spaces showing racks, termination blocks, and cable paths. Include following rooms:	A	GOV															
		1.7J.1a	Telecommunications rooms.	A	GOV															
		1.7J.2	Logical Drawings: Provide logical riser or schematic drawings for all systems.	A	GOV															
		1.7J.2a	Provide riser diagrams systems and interconnection drawings for equipment assemblies; show termination points and identify wiring connections.	A	GOV															
		1.7J.3	Access Panel Schedule on Submittal Drawings: Coordinate and prepare a location, size, and function schedule of access panels required to fully service equipment.	A	GOV															
		1.7K	Furnish electronic certified test reports to COR prior to final inspection and not more than 90 days after completion of tests.	A	GOV															
Spec Section 27 05 33 Raceways and Boxes for Communications Systems																				
		1.3A	In accordance with Section 27 50 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS, submit the following:	NA	NA															
		1.3A.1	Size and location of cabinets, splice boxes and pull boxes.	A	GOV															
		1.3A.2	Layout of required conduit penetrations through structural elements.	A	GOV															
		1.3A.3	Catalog cuts marked with specific item proposed and area of application identified.	A	GOV															
		1.3A.4	Provide coordination drawings, coordinate with mechanical, plumbing, sprinkler and electrical contractors.	A	GOV															
		1.3B	Certification: Provide letter prior to final inspection, certifying material is in accordance with construction documents and properly installed.	A	GOV															
Spec Section 27 10 00 Control, Communication and Signal Wiring																				
		1.3A	Submit in accordance with Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.	NA	NA															
		1.3B	Submit written certification from OEM:	A	GOV															

			PROJECT:	Repair-Replace Elevators in B-41															SUBMITTAL REGISTER	
			LOCATION:	Albuquerque, NM																
			PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:		36C25819D0036								
			CONTRACTOR:							TASK ORDER NO:		36C25819N0403								
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		1.3B.1	Indicate wiring and connection diagrams meet National and Government Life Safety Guidelines, NFPA, NEC, NRTL, Joint Commission, OEM, this section and Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.	A	GOV															
		1.3B.2	Include instructions, requirements, recommendations, and guidance for proper performance of system as described herein.	A	GOV															
		1.3B.3	Government shall not approve any submittal without this certification.	A	GOV															
		1.3C	Identify environmental specifications on technical submittals; identify requirements for installation.	A	GOV															
		1.3C.1	Minimum floor space and ceiling heights.	A	GOV															
		1.3C.2	Minimum size of doors for cable reel passage.	A	GOV															
		1.3D	Closeout Submittals:	A	GOV															
		1.3D.1	Provide contact information for maintenance personnel to contact contractor for emergency maintenance and logistic assistance, and assistance in resolving technical problems at any time during warranty period.	A	GOV															
		1.3D.2	Provide certified OEM sweep test tags from each cable reel to COR.	A	GOV															
		1.3D.3	Furnish spare or unused wire and cable with appropriate connectors (female types) for installation in appropriate punch blocks, barrier strips, patch, or bulkhead connector panels.	A	GOV															
		1.3D.4	Turn over unused and opened installation kit boxes, coaxial, fiber optic, and twisted pair cable reels, conduit, cable tray, cable duct bundles, wire rolls, physical installation hardware to COR.	A	GOV															
		1.3D.5	Documentation: Include any item or quantity of items, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to completely and correctly provide system documentation required herein.	A	GOV															
Spec Section 27 15 00 Communication Structured Cabling																				
		1.3A	In addition to requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS provide:	NA	NA															
		1.3A.1	List of test equipment as per Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.	A	GOV															
		1.3B	Certifications:	A	GOV															
		1.3B.1	Submit written certification from OEM indicating that proposed supervisor of installation and proposed provider of contract maintenance are authorized representatives of OEM. Include individual's legal name and address and OEM warranty credentials in the certification.	A	GOV															
		1.3B.2	Pre-acceptance Certification: Submit in accordance with test procedures.	A	GOV															
		1.3B.3	Test system cables and certify to COR before proof of performance testing can be conducted. Identify each cable as labeled on as-installed drawings.	A	GOV															
		1.3B.4	Provide current and qualified test equipment OEM training certificates and product OEM installation certification for contractor installation, maintenance, and supervisory personnel.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
				REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks			
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		1.3C	Closeout Submittal: Provide document from OEM certifying that each item of equipment installed conforms to OEM published specifications.	A	GOV																
Spec Section 28 05 00 Common Work Results For Electronic Safety and Security																					
		1.6A	Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.	NA	NA																
		1.6B	The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.	A	GOV																
		1.6C	Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.	A	GOV																
		1.6C.1	Mark the submittals, "SUBMITTED UNDER SECTION".	A	GOV																
		1.6C.2	Submittals shall be marked to show specification reference including the section and paragraph numbers.	A	GOV																
		1.6C.3	Submit each section separately.	A	GOV																
		1.6D	The submittals shall include the following:	A	GOV																
		1.6D.1	Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.	A	GOV																
		1.6D.2	Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.	A	GOV																
		1.6E	Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted. Additional general provisions are as follows:	A	GOV																
		1.6E.1	The Contractor shall schedule submittals in order to maintain the project schedule. For coordination drawings refer to Specification Section 01 33 10 - Design Submittal Procedures, which outline basic submittal requirements and coordination. Section 01 33 10 shall be used in conjunction with this section.	A	GOV																
		1.6E.2	The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.6E.3	Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware, etc.) which are required to produce an accurate and detailed depiction of the project.	A	GOV																
		1.6E.4	Manufacturer's information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for COR and Contractor review stamps.	A	GOV																
		1.6E.5	Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with VA CAD Standards CAD Standard Application Guide, and VA BIM Guide. FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED. The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the COR for approval before the initiation of work.	A	GOV																
		1.6E.6	Packaging: The Contractor shall organize the submissions according to the following packaging requirements.	A	GOV																
		1.6E.6a	Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.	A	GOV																
		1.6E.6a .1	Where two (2) or more binders are necessary to accommodate data; correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and/or maintenance of the component or system.	A	GOV																
		1.6E.6a .2	Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume number if applicable.	A	GOV																
		1.6E.6b	Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.	A	GOV																
		1.6E.6c	Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.	A	GOV																
		1.6E.6d	Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches, 20-pound, white bond paper.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.6E.6e	Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.	A	GOV															
		1.6E.6e .1	Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.	A	GOV															
		1.6E.6e .2	If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a type written page indicating the drawing title, description of contents and drawing location at the appropriate location of the manual.	A	GOV															
		1.6E.6e .3	Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16" tall.	A	GOV															
		1.6E.6f	Manual Content: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.	A	GOV															
		1.6E.6f .1	Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test and furnish the remaining manuals prior to contract completion.	A	GOV															
		1.6E.6f .2	Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.	A	GOV															
		1.6E.6f.3	The manuals shall include:	A	GOV															
		1.6E.6f .3a	Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.	A	GOV															
		1.6E.6f.3b	A control sequence describing start-up, operation, and shutdown.	A	GOV															
		1.6E.6f.3c	Description of the function of each principal item of equipment.	A	GOV															
		1.6E.6f.3d	Installation and maintenance instructions.	A	GOV															
		1.6E.6f.3e	Safety precautions.	A	GOV															
		1.6E.6f.3f	Diagrams and illustrations.	A	GOV															
		1.6E.6f.3g	Testing methods.	A	GOV															
		1.6E.6f.3h	Performance data.	A	GOV															
		1.6E.6f .3i	Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
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		1.6E.6f .3j	Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.	A	GOV																
		1.6E.6g	Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer to Group I through V Technical Data Package Submittal requirements for required section content.	A	GOV																
		1.6E.6h	Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.	A	GOV																
		1.6E.6i	Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.	A	GOV																
		1.6E.6j	General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.	A	GOV																
		1.6E.6k	Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.	A	GOV																
		1.6E.6l	Manufacturer's Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
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		1.6E.6m	Where manufacturer's standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.	A	GOV																
		1.6E.6n	Calculations: Provide a section for circuit and panel calculations.	A	GOV																
		1.6E.6o	Loading Sheets: Provide a section for DGP Loading Sheets.	A	GOV																
		1.6E.6p	Certifications: Provide section for Contractor's manufacturer certifications.	A	GOV																
		1.6E.7	Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer's catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.	A	GOV																
		1.6E.8	Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.	A	GOV																
		1.6E.9	Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.	A	GOV																
		1.6F	FIPS 201 Compliance Certificates	A	GOV																
		1.6F.1	Provide Certificates for all software components and device types utilizing credential verification. Provide certificates for:	A	GOV																
		1.6F.1a	Certificate Management	A	GOV																
		1.6F.1a.1	CAK Authentication System	A	GOV																
		1.6F.1a.2	PIV Authentication System	A	GOV																
		1.6F.1a.3	Certificate Validator	A	GOV																
		1.6F.1a.4	Cryptographic Module	A	GOV																
		1.6F.1b	<list devices and software>	A	GOV																
		1.6G	Approvals will be based on complete submission of manuals together with shop drawings.	A	GOV																
		1.6H	After approval and prior to installation, furnish the COR with one sample of each of the following:	A	GOV																
		1.6H.1	A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.	A	GOV																

PROJECT:	Repair-Replace Elevators in B-41																		SUBMITTAL REGISTER
LOCATION:	Albuquerque, NM																		
PROJECT NO:	501-19-101 | ACG: 19-262			CONTRACT NO:	36C25819D0036														
CONTRACTOR:				TASK ORDER NO:	36C25819N0403														

Activity #	Transmittal #	Paragraph #	Description	REQUIRED REVIEW BY AND APPROVER		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION DATES			APPROVER		APPROVING AUTHORITY DATES				Remarks
				A - A/E	GOV - VA / USACE	Submit	Approval Needed By	Material Needed By	Action Code	Date of Action	Date Forwarded to Approver / Authorized – Date Received from Contractor	A - A/E	GOV - VA / USACE	Date Approved by A/E Action Code	Date Approved by VA Action Code	Date Approved by USACE Action Code	Action Code	
		1.6H.2	Each type of conduit and pathway coupling, bushing and termination fitting.	A	GOV													
		1.6H.3	Conduit hangers, clamps and supports.	A	GOV													
		1.6H.4	Duct sealing compound.	A	GOV													
Spec Section 28 05 13 Conductors and Cables For Electronic Safety and Security																		
		1.5A	In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:	NA	NA													
		1.5A.1	Manufacturer's Literature and Data: Showing each cable type and rating.	A	GOV													
		1.5A.2	Certificates: Two weeks prior to final inspection, deliver to the Contracting Officer's Representative (COR) four copies of the certification that the material is in accordance with the drawings and specifications and diagrams for cable management system.	A	GOV													
		1.5A.3	Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:	A	GOV													
		1.5A.3a	Vertical and horizontal offsets and transitions.	A	GOV													
		1.5A.3b	Clearances for access above and to side of cable trays.	A	GOV													
		1.5A.3c	Vertical elevation of cable trays above the floor or bottom of ceiling structure.	A	GOV													
		1.5A.3d	Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.	A	GOV													
		1.5A.3e	System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.	A	GOV													
		1.5A.4	Wiring Diagrams. Show typical wiring schematics including the following:	A	GOV													
		1.5A.4a	Workstation outlets, jacks, and jack assemblies.	A	GOV													
		1.5A.4b	Patch cords.	A	GOV													
		1.5A.4c	Patch panels.	A	GOV													
		1.5A.5	Cable Administration Drawings: As specified in Part 3 "Identification" Article.	A	GOV													
		1.5A.6	Project planning documents as specified in Part 3.	A	GOV													
		1.5A.7	Maintenance Data: For wire and cable to include in maintenance manuals.	A	GOV													
Spec Section 28 05 26 Grounding and Bonding For Electronic Safety and Security																		
		1.3A	Submit in accordance with Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.	NA	NA													
		1.3B	Shop Drawings:	A	GOV													
		1.3B.1	Clearly present enough information to determine compliance with drawings and specifications.	A	GOV													
		1.3B.2	Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.	A	GOV													
		1.3C	Test Reports: Provide certified test reports of ground resistance.	A	GOV													
		1.3D	Certifications: Two weeks prior to final inspection, submit four copies of the following to the COR:	A	GOV													

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.3D.1	Certification that the materials and installation are in accordance with the drawings and specifications.	A	GOV															
		1.3D.2	Certification by the contractor that the complete installation has been properly installed and tested.	A	GOV															
Spec Section 28 05 28.33			Conduits and Backboxes For Electronic Safety and Security																	
		1.5A	Submit in accordance with Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Furnish the following:	NA	NA															
		1.5B	Shop Drawings:	A	GOV															
		1.5B.1	Size and location of main feeders;	A	GOV															
		1.5B.2	Size and location of panels and pull boxes	A	GOV															
		1.5B.3	Layout of required conduit penetrations through structural elements.	A	GOV															
		1.5B.4	The specific items proposed and its area of application shall be identified on the catalog cuts.	A	GOV															
		1.5C	Certification: Prior to final inspection, deliver to the Contracting Officer's Representative (COR) four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.	A	GOV															
		1.5D	Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.	A	GOV															
		1.5E	Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.	A	GOV															
		1.5E.1	Custom enclosures and cabinets.	A	GOV															
		1.5E.2	Handholes and boxes for underground wiring, including the following:	A	GOV															
		1.5E.2a	Duct entry provisions, including locations and duct sizes.	A	GOV															
		1.5E.2b	Frame and cover design.	A	GOV															
		1.5E.2c	Grounding details.	A	GOV															
		1.5E.2d	Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.	A	GOV															
		1.5E.2e	Joint details.	A	GOV															
		1.5F	Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:	A	GOV															
		1.5F.1	Structural members in the paths of conduit groups with common supports.	A	GOV															
		1.5F.2	HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.	A	GOV															
		1.5G	Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, shall withstand seismic forces defined in Division 16 Section "Electrical Supports and Seismic Restraints." Include the following:	A	GOV															
		1.5G.1	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.5G.1a	The term "withstand" means "the cabinet or enclosure shall remain in place without separation of any parts when subjected to the seismic forces specified and the unit shall retain its enclosure characteristics, including its interior accessibility, after the seismic event."	A	GOV																
		1.5G.2	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.	A	GOV																
		1.5G.3	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.	A	GOV																
		1.5H	Source quality-control test reports.	A	GOV																
Spec Section 28 08 00 Commissioning of Electronic Safety and Security Systems																					
		1.6A	The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.	NA	NA																
		1.6B	Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.	A	GOV																
Spec Section 28 13 00 PACS																					
		1.4A	Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1	NA	NA																
		1.4B	Submit below items in conjunction with Master Specification Sections 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, Section 02 41 00, DEMOLITION, and Section 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.	A	GOV																
		1.4C	Provide certificates of compliance with Section 1.3, Quality Assurance.	A	GOV																
		1.4D	Provide a complete and thorough pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.	A	GOV																
		1.4E	Shop drawing and as-built packages shall include:	A	GOV																
		1.4E.1	Index Sheet that shall:	A	GOV																
		1.4E.1a	Define each page of the design package to include facility name, building name, floor, and sheet number.	A	GOV																
		1.4E.1b	Provide a complete list of all security abbreviations and symbols.	A	GOV																
		1.4E.1c	Reference all general notes that are utilized within the design package.	A	GOV																
		1.4E.1d	Specification and scope of work pages for all individual security systems that are applicable to the design package that will:	A	GOV																
		1.4E.1d .1	Outline all general and job specific work required within the design package.	A	GOV																
		1.4E.1d .2	Provide a detailed device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.	A	GOV																
		1.4E.2	Drawing sheets that will be plotted on the individual floor plans or site plans shall:	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																	
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036										
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403										
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		1.4E.2a	Include a title block as defined above.	A	GOV															
		1.4E.2b	Clearly define the drawings scale in both standard and metric measurements.	A	GOV															
		1.4E.2c	Provide device identification and location.	A	GOV															
		1.4E.2d	Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers).	A	GOV															
		1.4E.2e	Identify all pull box and conduit locations, sizes, and fill capacities.	A	GOV															
		1.4E.2f	Address all general and drawing specific notes for a particular drawing sheet.	A	GOV															
		1.4E.3	A detailed riser drawing for each applicable security subsystem shall:	A	GOV															
		1.4E.3a	Indicate the sequence of operation.	A	GOV															
		1.4E.3b	Relationship of integrated components on one diagram.	A	GOV															
		1.4E.3c	Include the number, size, identification, and maximum lengths of interconnecting wires.	A	GOV															
		1.4E.3d	Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.	A	GOV															
		1.4E.4	A detailed system drawing for each applicable security system shall:	A	GOV															
		1.4E.4a	Clearly identify how all equipment within the system, from main panel to device, shall be laid out and connected.	A	GOV															
		1.4E.4b	Provide full detail of all system components wiring from point-to-point.	A	GOV															
		1.4E.4c	Identify wire types utilized for connection, interconnection with associate security subsystems.	A	GOV															
		1.4E.4d	Show device locations that correspond to the floor plans.	A	GOV															
		1.4E.4e	All general and drawing specific notes shall be included with the system drawings.	A	GOV															
		1.4E.5	A detailed schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:	A	GOV															
		1.4E.5a	Device ID.	A	GOV															
		1.4E.5b	Device Location (e.g. site, building, floor, room number, location, and description).	A	GOV															
		1.4E.5c	Mounting type (e.g. flush, wall, surface).	A	GOV															
		1.4E.5d	Power supply or circuit breaker and power panel number.	A	GOV															
		1.4E.5e	In addition, for the PACS, provide the door ID, door type (e.g. wood or metal), locking mechanism (e.g. strike or electromagnetic lock) and control device (e.g. card reader or biometrics).	A	GOV															
		1.4E.6	Detail and elevation drawings for all devices that define how they were installed and mounted.	A	GOV															

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262						CONTRACT NO:	36C25819D0036											
		CONTRACTOR:							TASK ORDER NO:	36C25819N0403											
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		1.4F	Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.																		
		1.4G	Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per Section 01 00 00, GENERAL REQUIREMENTS, and Section 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.	A	GOV																
		1.4H	General: Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. Additional general provisions are as follows:	A	GOV																
		1.4H.1	The Contractor shall schedule submittals in order to maintain the project schedule. For coordination drawings refer to Specification Section 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES , which outline basic submittal requirements and coordination.	A	GOV																
		1.4H.2	The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.	A	GOV																
		1.4H.3	Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware) which are required to produce an accurate and detailed depiction of the project.	A	GOV																
		1.4H.4	Manufacturer's information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for COR and Contractor review stamps.	A	GOV																
		1.4H.5	Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with VA CAD Standards. FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED. The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the COR for approval before the initiation of work.	A	GOV																
		1.4H.6	Packaging: The Contractor shall organize the submissions according to the following packaging requirements.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.4H.6a	Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.	A	GOV																
		1.4H.6a.1	Where two (2) or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and or maintenance of the component or system.	A	GOV																
		1.4H.6a.2	Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume	A	GOV																
		1.4H.6b	Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.	A	GOV																
		1.4H.6c	Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.	A	GOV																
		1.4H.6d	Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches 20 pound white bond paper.	A	GOV																
		1.4H.6e	Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.	A	GOV																
		1.4H.6e.1	Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.	A	GOV																
		1.4H.6e.2	If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a	A	GOV																
		1.4H.6e.3	Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16" tall.	A	GOV																
		1.4H.6f	Manual Content: In each manual include information specified in the individual Specification section, and the following information for each major component of building equipment and controls:	A	GOV																
		1.4H.6f.1	General system or equipment description.	A	GOV																
		1.4H.6f.2	Design factors and assumptions.	A	GOV																
		1.4H.6f.3	Copies of applicable Shop Drawings and Product Data.	A	GOV																
		1.4H.6f.4	System or equipment identification including: manufacturer, model and serial numbers of each component, operating instructions, emergency instructions, wiring diagrams, inspection and test procedures, maintenance procedures and schedules, precautions against improper use and maintenance, repair instructions, sources of required maintenance materials and related services, and a manual index.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.4H.6g	Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer to Group I through V Technical Data Package Submittal requirements for required section content.	A	GOV																
		1.4H.6h	Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.	A	GOV																
		1.4H.6i	Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.	A	GOV																
		1.4H.6j	General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.	A	GOV																
		1.4H.6k	Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems, or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.	A	GOV																
		1.4H.6l	Manufacturer's Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
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		1.4H.6m	Where manufacturer's standard printed data is not available and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.	A	GOV																
		1.4H.6n	Calculations: Provide a section for circuit and panel calculations.	A	GOV																
		1.4H.6o	Loading Sheets: Provide a section for DGP Loading Sheets.	A	GOV																
		1.4H.6p	Certifications: Provide section for Contractor's manufacturer certifications.	A	GOV																
		1.4H.7	Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer's catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.	A	GOV																
		1.4H.8	Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.	A	GOV																
		1.4H.9	Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.	A	GOV																
		1.4I	FIPS 201 Compliance Certificates	A	GOV																
		1.4I.1	Provide Certificates for all software components and device types utilizing credential verification. Provide certificates for:	A	GOV																
		1.4I.1a	Card Readers	A	GOV																
		1.4I.1b	PIV Middelware	A	GOV																
		1.4I.1c	Template Matcher	A	GOV																
		1.4J	Approvals will be based on complete submission of manuals together with shop drawings.	A	GOV																
Spec Section 28 23 00 Video Surveillance																					
		1.5A	Submit below items in conjunction with Master Specification Sections 01 33 23, Shop Drawings, Product Data, and Samples, and Section 02 41 00, Demolition Drawings.	NA	NA																
		1.5B	Provide certificates of compliance with Section 1.4, Quality Assurance.	A	GOV																

		PROJECT:	Repair-Replace Elevators in B-41																	SUBMITTAL REGISTER	
		LOCATION:	Albuquerque, NM																		
		PROJECT NO:	501-19-101 | ACG: 19-262					CONTRACT NO:	36C25819D0036												
		CONTRACTOR:						TASK ORDER NO:	36C25819N0403												
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		1.5C	Provide a pre-installation and as-built design package in both electronic format and on paper, minimum size 1220 x 1220 millimeters (48 x 48 inches); drawing submittals shall be per the established project schedule.	A	GOV																
		1.5D	Pre-installation design and as-built packages shall include:	A	GOV																
		1.5D.1	Index Sheet that shall:	A	GOV																
		1.5D.1a	Define each page of the design package to include facility name, building name, floor, and sheet number.	A	GOV																
		1.5D.1b	Provide a list of all security abbreviations and symbols.	A	GOV																
		1.5D.1c	Reference all general notes that are utilized within the design package.	A	GOV																
		1.5D.1d	Specification and scope of work pages for all security systems that are applicable to the design package that will:	A	GOV																
		1.5D.1d.1	Outline all general and job specific work required within the design package.	A	GOV																
		1.5D.1d.2	Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.	A	GOV																
		1.5D.2	Floor plans, site plans, and enlarged plans shall:	A	GOV																
		1.5D.2a	Include a title block as defined above.	A	GOV																
		1.5D.2b	Define the drawings scale in both standard and metric measurements.	A	GOV																
		1.5D.2c	Provide device identification and location.	A	GOV																
		1.5D.2d	Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers).	A	GOV																
		1.5D.2e	Identify all pull box and conduit locations, sizes, and fill capacities.	A	GOV																
		1.5D.2f	Address all general and drawing specific notes for a particular drawing sheet.	A	GOV																
		1.5D.3	A riser drawing for each applicable security subsystem shall:	A	GOV																
		1.5D.3a	Indicate the sequence of operation.	A	GOV																
		1.5D.3b	Relationship of integrated components on one diagram.	A	GOV																
		1.5D.3c	Include the number, size, identification, and maximum lengths of interconnecting wires.	A	GOV																
		1.5D.3d	Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that shall correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.	A	GOV																
		1.5D.4	A system drawing for each applicable security system shall:	A	GOV																
		1.5D.4a	Identify how all equipment within the system, from main panel to device, shall be laid out and connected.	A	GOV																
		1.5D.4b	Provide full detail of all system components wiring from point-to-point.	A	GOV																
		1.5D.4c	Identify wire types utilized for connection, interconnection with associate security subsystems.	A	GOV																
		1.5D.4d	Show device locations that correspond to the floor plans.	A	GOV																
		1.5D.4e	All general and drawing specific notes shall be included with the system drawings.	A	GOV																

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		1.5D.5	A schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:	A	GOV															
		1.5D.5a	Device ID.	A	GOV															
		1.5D.5b	Device Location (e.g. site, building, floor, room number, location, and description).	A	GOV															
		1.5D.5c	Mounting type (e.g. flush, wall, surface).	A	GOV															
		1.5D.5d	Power supply or circuit breaker and power panel number.	A	GOV															
		1.5D.5e	In addition, for the VASS Systems, provide the camera ID, camera type (e.g. fixed or pan/tilt/zoom (P/T/Z), lens type (e.g. for fixed cameras only) and housing model number.	A	GOV															
		1.5E	Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.	A	GOV															
		1.5F	Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.	A	GOV															
Spec Section 28 31 00 Fire Detection and Alarm																				
		1.4A	General: Submit 5 copies in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.	NA	NA															
		1.4B	Drawings:	A	GOV															
		1.4B.1	Prepare drawings using AutoCAD latest Release software and include all contractors information. Layering shall be by VA criteria as provided by the Contracting Officer Representative (COR). Bid drawing files on AutoCAD shall be provided to the Contractor at the pre-construction meeting. The contractor shall be responsible for verifying all critical dimensions shown on the drawings provided by VA.	A	GOV															
		1.4B.2	Floor plans: Provide locations of all devices (with device number at each addressable device corresponding to control unit programming), appliances, panels, equipment, junction/terminal cabinets/boxes, risers, electrical power connections, individual circuits and raceway routing, system zoning; number, size, and type of raceways and conductors in each raceway; conduit fill calculations with cross section area percent fill for each type and size of conductor and raceway. Only those devices connected and incorporated into the final system shall be on these floor plans. Do not show any removed devices on the floor plans. Show all interfaces for all fire safety functions.	A	GOV															

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		1.4B.3	Riser diagrams: Provide, for the entire system, the number, size and type of riser raceways and conductors in each riser raceway and number of each type device per floor and zone. Show door holder interface, elevator control interface, HVAC shutdown interface, fire extinguishing system interface, and all other fire safety interfaces. Show wiring Styles on the riser diagram for all circuits. Provide diagrams both on a per building and campus wide basis.	A	GOV																
		1.4B.4	Detailed wiring diagrams: Provide for control panels, modules, power supplies, electrical power connections, auxiliary relays and annunciators showing termination identifications, size and type conductors, circuit boards, LED lamps, indicators, adjustable controls, switches, ribbon connectors, wiring harnesses, terminal strips and connectors, spare zones/circuits, battery and battery calculations. Diagrams shall be drawn to a scale sufficient to show spatial relationships between components, enclosures and equipment configuration.	A	GOV																
		1.4B.5	Two weeks prior to final inspection, the Contractor shall deliver to the COR 3 sets of as-built drawings and one set of the as-built drawing computer files (using AutoCAD latest release) . As-built drawings (floor plans) shall show all new and/or existing conduit used for the fire alarm system.	A	GOV																
		1.4C	Manuals:	A	GOV																
		1.4C.1	Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets for all items used in the system, power requirements, device wiring diagrams, dimensions, and information for ordering replacement parts.	A	GOV																
		1.4C.1a	Wiring diagrams shall have their terminals identified to facilitate installation, operation, expansion and maintenance.	A	GOV																
		1.4C.1b	Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.	A	GOV																
		1.4C.1c	Include complete listing of all software used and installation and operation instructions including the input/output matrix chart.	A	GOV																
		1.4C.1d	Provide a clear and concise description of operation that gives, in detail, the information required to properly operate, inspect, test and maintain the equipment and system. Provide all manufacturer's installation limitations including circuit length limitations.	A	GOV																
		1.4C.1e	Complete listing of all digitized voice messages.	A	GOV																
		1.4C.1f	Provide standby battery calculations under normal operating and alarm modes. Battery calculations shall include the magnets for holding the doors open for one minute.	A	GOV																
		1.4C.1g	Include information indicating who will provide emergency service and perform post contract maintenance.	A	GOV																
		1.4C.1h	Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.	A	GOV																

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		1.4C.1i	A computerized preventive maintenance schedule for all equipment. The schedule shall be provided on disk in a computer format acceptable to the VAMC and shall describe the protocol for preventive maintenance of all equipment. The schedule shall include the required times for systematic examination, adjustment and cleaning of all equipment. A print out of the schedule shall also be provided in the manual. Provide the disk in a pocket within the manual.	A	GOV																
		1.4C.1j	Furnish manuals in 3 ring loose-leaf binder or manufacturer's standard binder.	A	GOV																
		1.4C.1k	A print out for all devices proposed on each signaling line circuit with spare capacity indicated.	A	GOV																
		1.4C.2	Two weeks prior to final inspection, deliver 4 copies of the final updated maintenance and operating manual to the COR.	A	GOV																
		1.4C.2a	The manual shall be updated to include any information necessitated by the maintenance and operating manual approval.	A	GOV																
		1.4C.2b	Complete "As installed" wiring and schematic diagrams shall be included that shows all items of equipment and their interconnecting wiring. Show all final terminal identifications.	A	GOV																
		1.4C.2c	Complete listing of all programming information, including all control events per device including an updated input/output matrix.	A	GOV																
		1.4C.2d	Certificate of Installation as required by NFPA 72 for each building. The certificate shall identify any variations from the National Fire Alarm Code.	A	GOV																
		1.4C.2e	Certificate from equipment manufacturer assuring compliance with all manufacturers installation requirements and satisfactory system operation.	A	GOV																
		1.4D	Certifications:	A	GOV																
		1.4D.1	Together with the shop drawing submittal, submit the technician's NICET level III fire alarm certification as well as certification from the control unit manufacturer that the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include in the certification the names and addresses of the proposed supervisor of installation and the proposed performer of contract maintenance. Also include the name and title of the manufacturer's representative who makes the certification.	A	GOV																
		1.4D.2	Together with the shop drawing submittal, submit a certification from either the control unit manufacturer or the manufacturer of each component (e.g., smoke detector) that the components being furnished are compatible with the control unit.	A	GOV																
		1.4D.3	Together with the shop drawing submittal, submit a certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL and NFPA 72 requirements.	A	GOV																

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New Mexico VA Health Care System
Repair-Replace Elevators in B-41
Project: 501-19-101

APOGEE
Engineers | Architects

1151 Kildaire Farm Road
Cary, NC 27511
acg-pa.com

Walter David Van Scoter, RA
Registered Architect

Robert H Armbrester, PE
Mechanical Engineer

Joshua A. VandenEnde, PE
Electrical Engineer

Date: January 27, 2023

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DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS

TABLE OF CONTENTS
Section 00 01 10

SECTION NO.	DIVISION AND SECTION TITLES	DATE
	DIVISION 01 - GENERAL REQUIREMENTS	
01 00 00	General Requirements	03-20
	VA Furnished ACM Report	
01 32 16.15	Project Schedules (Small Projects - Design/Bid/Build	03-20
01 33 23	Shop Drawings, Product Data, and Samples	05-17
01 42 19	Reference Standards	09-19
01 45 00	Quality Control	03-19
01 45 29	Testing Laboratory Services	11-18
01 45 35	Special Inspections	03-19
01 45 36	Schedule of Special Inspections	03-20
01 58 16	Temporary Interior Signage	07-15
01 91 00	General Commissioning Requirements	10-15
	DIVISION 02 - EXISTING CONDITIONS	
02 41 00	Demolition	08-16
02 41 19	Selective Demolition	08-17
02 82 13.13	Glovebag Asbestos Abatement	09-15
	DIVISION 05 - METALS	
05 50 00	Metal Fabrications	08-18
05 59 00	Metal Restoration and Cleaning	08-18
	DIVISION 06 - WOOD, PLASTICS AND COMPOSITES	
06 10 00	Rough Carpentry	10-17
	DIVISION 07 - THERMAL AND MOISTURE PROTECTION	
07 72 00	Roof Accessories	10-15
07 81 00	Applied Fireproofing	10-17
07 84 00	Firestopping	02-16
07 92 00	Joint Sealants	10-17
	DIVISION 08 - OPENINGS	
08 11 13	Hollow Metal Doors and Frames	08-16
08 71 00	Door Hardware	01-20
	DIVISION 09 - FINISHES	
09 05 16	Subsurface Preparation for Floor Finishes	02-15

SECTION NO.	DIVISION AND SECTION TITLES	DATE
09 22 16	Non-Structural Metal Framing	06-18
09 29 00	Gypsum Board	06-18
09 51 00	Acoustical Ceilings	12-18
09 65 19	Resilient Tile Flooring	05-18
09 91 00	Painting	01-16
	DIVISION 10 – SPECIALTIES	
10 44 13	Fire Extinguisher Cabinets	08-18
	DIVISION 13 - SPECIAL CONSTRUCTION	
13 05 41	Seismic Restraint Requirements for Non-Structural Components	01-14
	DIVISION 14 – CONVEYING EQUIPEMENT	
14 12 11	Traction and Winding Drum Dumbwaiter	03-20
14 21 10	Modernization of Traction Elevators	10-19
	DIVISION 21 - FIRE SUPPRESSION	
21 08 00	Commissioning of Fire Suppression System	11-16
21 13 13	Wet-Pipe Sprinkler Systems	06-15
	DIVISION 22 – PLUMBING	
22 05 11	Common Work Results for Plumbing	07-16
22 05 12	General Motor Requirements for Plumbing Equipment	09-15
22 05 19	Meters and Gauges for Plumbing Piping	09-15
22 05 23	General-Duty Valves for Plumbing Piping	09-15
22 07 11	Plumbing Insulation	09-19
22 14 29	Sump Pumps	09-15
	DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)	
23 05 11	Common Work Results for HVAC	02-20
23 05 12	General Motor Requirements for HVAC and Steam Generation Equipment	02-20
23 05 41	Noise and Vibration Control for HVAC Piping and Equipment	02-20
23 05 93	Testing, Adjusting, and Balancing for HVAC	02-20
23 07 11	HVAC and Boiler Plant Insulation	02-20
23 08 00	Commissioning of HVAC Systems	02-20
23 09 23	Direct-Digital Control System for HVAC	09-11
23 22 13	Steam and Condensate Heating Piping	02-20
23 23 00	Refrigerant Piping	02-20
23 31 00	HVAC Ducts and Casings	02-20
23 34 00	HVAC Fans	02-20

SECTION NO.	DIVISION AND SECTION TITLES	DATE
23 36 00	Air Terminal Units	02-20
23 37 00	Air Outlets and Inlets	02-20
23 40 00	HVAC Air Cleaning Devices	03-20
23 73 00	Indoor Central-Station Air-Handling Units	03-20
23 81 00	Decentralized Unitary HVAC Equipment	03-20
23 82 16	Air Coils	03-20
	DIVISION 26 – ELECTRICAL	
26 05 11	Requirements for Electrical Installations	01-16
26 05 19	Low-Voltage Electrical Power Conductors and Cables	01-17
26 05 26	Grounding and Bonding for Electrical Systems	01-17
26 05 33	Raceway and Boxes for Electrical Systems	01-18
26 05 73	Overcurrent Protective Device Coordination Study	01-18
26 22 00	Low-Voltage Transformers	01-18
26 24 16	Panelboards	01-18
26 27 26	Wiring Devices	01-18
26 29 11	Motor Controllers	01-18
26 29 21	Enclosed Switches and Circuit Breakers	01-17
26 43 13	Surge Protective Devices	01-17
26 51 00	Interior Lighting	01-18
	DIVISION 27 – COMMUNICATIONS	
27 05 11	Requirements for Communications Installations	09-19
27 05 33	Raceways and Boxes for Communications Systems	10-18
27 10 00	Control, Communication and Signal Wiring	06-15
27 15 00	Communications Structured Cabling	01-16
	DIVISION 28 – ELECTRONIC SAFETY AND SECURITY	
28 05 00	Common Work Results for Electronic Safety and Security	04-18
28 05 13	Conductors and Cables for Electronic Safety and Security	10-18
28 05 26	Grounding and Bonding for Electronic Safety and Security	09-11
28 05 28.33	Conduits and Backboxes for Electronic Safety and Security	09-11
28 08 00	Commissioning of Electronic Safety and Security Systems	02-20
28 13 00	Physical Access Control System	10-11
28 23 00	Video Surveillance	09-11
28 31 00	Fire Detection and Alarm	10-11

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SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for New Mexico VA Health Care System - Raymond G. Murphy VA Medical Center, VA Project No. 501-19-101 as required by drawings and specifications.

B. Prebid site visits will be identified in the project solicitation. Additional Pre-bid site visits will not be authorized. After award site visits to approved personnel may be made by appointment only. Coordinate with the contracting officer representative (COR) for these requests.

C. Offices of Apogee Consulting Group P.A., as Architect Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

D. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three workdays unless otherwise designated by the COR.

E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

1.2 STATEMENT OF BID ITEM(S)

A. ITEM I,GENERAL CONSTRUCTION: Work includes general construction, alterations, necessary removal of existing structures and construction and certain other items. Construction shall modernization of the elevators will ensure up to date compliance with required guidelines. The modernization includes Building 10 In-ground hydraulic passenger elevator #1. Additionally, elevators modernization work will include overhead gearless traction elevators Services elevators 1-4(S1-4) and

Passenger elevators 1-4(P1-4). Minor repairs to Building 41 service elevator #5. Full replacement of Building 41 Dumbwaiter #4.

ITEM II, Electrical Work: Work includes all labor, material, equipment and supervision to perform the required electrical construction work on this project including new disconnects, cab and machine room lighting, low voltage upgrades, and electrical upgrade distribution.

ITEM III, Mechanical Work: Work includes all labor, material, equipment, and supervision to perform the required Mechanical construction work on this project including installation of Building 41 AHU and upgrade of ventilation distribution, and cooling.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. Drawings and contract documents may be obtained from the website where the solicitation is posted. Additional copies will be at Contractor's expense.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. General Contractor’s employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
   a. Except for initiating registration with the PIV Sponsor, personnel conducting business pursuant to this contract shall not enter VA owned or leased property without a current and valid VA issued badge. Personnel may also be subject to inspection of their personal effects, including tool boxes, lockers, vehicle, or any other container, whilst on VA owned or leased property upon request from VA Police.

   b. To be processed for a VA ID badge, contact project specific COR arrange for an appointment and to receive information on the required documentation. The appropriate contact information will

be issued during the Pre-Construction meeting with the Contracting Officer and the Contracting Officer's Representative (COR). Applicants may be subject to the following classifications of badging:

(i) Flash Badge: common physical access and no biometric information required

(ii) Non-PIV Badge: common physical, restricted physical, and sensitive records access; subject to submitting fingerprints; subject to submitting to a Special Agreement Check (SAC) for a background investigation (allow for 14 calendar days to adjudicate)

(iii) Full PIV Badge: common physical, restricted physical, sensitive records, and logical/data access; subject to submitting fingerprints; subject to submitting to a Special Agreement Check (SAC) for a background investigation (allow for 14 calendar days to adjudicate); subject to submitting to a National Agency Check with Written Inquiries (NACI) background investigation (allow for 60 days to adjudicate).

The level of badging and its corresponding duration of investigation are directly dependent on the level of security access required to perform contract tasks. Refer to the contract drawings for security level access assessments.

2. Before starting work the General Contractor shall give one week's notice to the Contracting Officer so that escort arrangement and coordination can be established and can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. For any door controlling entrance to the construction area(s), the VA will supply to the contractor a door lock and/or its corresponding key, the contractor will provide all remaining door

hardware to support the ABQ VA keying system. The General Contractor will be responsible for ensuring the construction site remains under lock and key to prevent the general population from entering the site. Upon project completion, the General Contractor must return the lock and key to the COR.

2. Reference Medical Center Memorandum FES-138-10 for Key Control requirements

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
   a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
   b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

E. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. Contractor shall confine all operations (including storage of materials) in project area. Any other use of areas on the Government premises to be authorized or approved by the Contracting Officer Representative. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor’s performance..

1.5 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(FAR 52.236-10)

D. Working space and space available for storing materials shall be provided by contractor offsite at no cost to VA. Offsite contractor storage should be coordinated with COR.

E. Workers are subject to rules of Medical Center applicable to their conduct.

F. Execute work in such a manner as to interfere as little as possible with work being done by others.

G. Execute work so as to interfere as little as possible with normal functioning of Raymond G. Murphy VA Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by COR where required by limited working space. Any activities that involve the circumstances above should be coordinate for after normal business hours during the weekend.

1. Do not store materials and equipment in other than assigned areas.
2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days or as determined acceptable by COR. Provide unobstructed access to Raymond G. Murphy VA Medical Center areas required to remain in operation.
3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

H. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR. All such actions shall be coordinated with the COR or Utility Company involved:

I. Phasing:

The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and

coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks. The work to be outlined shall include, but not be limited to:

To ensure such executions, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR 30 days in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to ensure accomplishment of this work in successive phases mutually agreeable to Raymond G. Murphy VA Medical Center COR and Contractor, as outlined below. Adjustments to phasing plan as a result of contractor means and methods shall be verified and coordinated with COR. For general phasing of Building 41 elevator work please refer to phasing on Sheet G-100. For general phasing of Building 10 elevator work please refer to phasing on Sheet G-108.

J. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated from the construction area by temporary partitions and have walking surfaces, lighting etc. to facilitate patient and staff access. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

K. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:

1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.

2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.
3. Contractor shall guarantee upkeep and continuous operation of elevators.
   a. Furnish complete inspection and maintenance service on entire elevator installation for a period of one (1) year after completion and acceptance of all the elevators in this specification by the COR. This maintenance service shall run concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.
   b. Furnish complete preventive inspection, interim and warranty maintenance service on entire elevator installation for a period of one (1) year after completion and acceptance of all the car lifts in this specification by the Resident Engineer. This maintenance service shall begin concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.
   c. Upon completion of the engineering phase and submittal process and not less than 30 days prior to mobilization of the project, Contractor to provide interim maintenance for all vertical transportation units being modernized or replaced. These units are as followsP1-P4 Gearless Traction Elevators, S1-S4 Gearless Traction Elevators, T-1 Geared Traction Cart-lift, and Building 10 Hydraulic Elevator 1.

L. Utilities Services: Maintain existing utility services for • at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR . Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, the Medical Center Director’s prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS and 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY for additional requirements.
2. Contractor shall submit a request to interrupt any such services to COR and other VA project representatives, in writing, 30 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Raymond G. Murphy VA Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 30 calendar days prior to the desired time and shall be performed as directed by the COR.
5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

M. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred

spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

N. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

O. Coordination of Construction with Cemetery Director: The burial activities at a National Cemetery shall take precedence over construction activities. The Contractor must cooperate and coordinate with the Cemetery Director, through the COR, in arranging construction schedule to cause the least possible interference with cemetery activities in actual burial areas. Construction noise during the interment services shall not disturb the service. Trucks and workers shall not pass through the service area during this period:

1. The Contractor is required to discontinue his work sufficiently in advance of Easter Sunday, Mother's Day, Father's Day, Memorial Day, Veteran's Day and/or Federal holidays, to permit him to clean up all areas of operation adjacent to existing burial plots before these dates.
2. Cleaning up shall include the removal of all equipment, tools, materials and debris and leaving the areas in a clean, neat condition.

1.6 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR and Elevator Design Consultant and a representative of VA Engineering Facilities of buildings and areas of buildings in which alterations occur and furnish a report, signed by both to the Contracting Officer.

This report shall list by rooms and spaces to deviate from Basis of Design:

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of buildings.
2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.

3. Shall note any discrepancies between drawings and existing conditions at site.
4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations will occur and which have been agreed upon by Contractor COR.
5. Elevator Components related to the project requirements and scope of work.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4).

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workers in executing work of this contract.

D. Protection: Provide the following protective measures:
1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled, and equipment moved and/or relocated.
3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately

protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.7 DISPOSAL AND RETENTION

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from Raymond G. Murphy VA Medical Center.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

1.8 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workers to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.

D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.9 PHYSICAL DATA

A. Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by _____.

(FAR 52.236-4)

B. Subsurface conditions have been developed by core borings and test pits. Logs of subsurface exploration are shown diagrammatically on drawings.

C. A copy of the soil report will be made available for inspection by bidders upon request to the COR at the VA Medical Center, _____ and shall be considered part of the contract documents.

D. Government does not guarantee that other materials will not be encountered, nor that proportions, conditions, or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly. Upon proper application to Department of Veterans Affairs, bidders will be permitted to make subsurface explorations of their own at site.

1.10 PROFESSIONAL SURVEYING SERVICES

A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections.

The Contractor shall certify that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

1.11 LAYOUT OF WORK

A. The Contractor shall lay out the work from Government established base lines and benchmarks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(FAR 52.236-17)

B. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the COR before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.

C. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings.

Furnish such certification to the COR before any major items of concrete work are placed. In addition, COR certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.

1. Lines of each building and/or addition.
2. Elevations of bottoms of footings and tops of floors of each building and/or addition.
3. Lines and elevations of sewers and of all outside distribution systems.

D. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to COR.

D*. Upon completion of the work, the Contractor shall furnish the COR one electronic copy and reproducible drawings at the scale of the contract drawings, showing the finished grade on the grid developed for constructing the work, including burial monuments and fifty foot stationing along new road centerlines. These drawings shall bear the seal of the registered land surveyor or registered civil engineer.

E. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.12 WARRANTY MANAGEMENT

A. Warranty Management Plan: Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction at least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesman, or of engineering background, not necessarily familiar with this contract. The term “status” as indicated below must include due date and whether item has been submitted or was approved. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly

invoice for payment. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of the project acceptance and continue for the product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contactor and the Contracting Officer. Include in the warranty management plan, but not limited to, the following:

1. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the company of the Contractor, subcontractors, manufacturers or suppliers involved.
2. Furnish with each warranty the name, address and telephone number of each of the guarantor’s representatives nearest project location.
3. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers and for all commissioned systems such as fire protection and alarm systems, sprinkler systems and lightning protection systems, etc.
4. A list for each warranted equipment item, feature of construction or system indicating:
   a. Name of item.
   b. Model and serial numbers.
   c. Location where installed.
   d. Name and phone numbers of manufacturers and suppliers.
   e. Name and phone numbers of manufacturers or suppliers.
   f. Names, addresses and phone numbers of sources of spare parts.
   g. Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
   h. Starting point and duration of warranty period.
   i. Summary of maintenance procedures required to continue the warranty in force.
   j. Cross-reference to specific pertinent Operation and Maintenance manuals.
   k. Organizations, names and phone numbers of persons to call for warranty service.

l. Typical response time and repair time expected for various warranted equipment.

5. The plans for attendance at the 4 and 9-month post construction warranty inspections conducted by the government.
6. Procedure and status of tagging of all equipment covered by extended warranties.
7. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

B. Performance Bond: The Performance Bond must remain effective throughout the construction period.
   1. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
   2. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the contractor’s expenses, the Contracting Officer will have the right to recoup expenses from the bonding company.
   3. Following oral or written notification of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

C. Pre-Warranty Conference: Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/ reviewed at this meeting. In connection with these requirements and at the time of the Contractor’s quality control completion inspection, furnish the name, telephone number and address

of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contract will be located within the local service area of the warranted construction, be continuously available and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in conjunction with other portions of this provision.

D. Contractor's Response to Construction Warranty Service Requirements: Following oral or written notification by the Contracting Officer, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

1. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.
2. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.
3. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.
4. The "Construction Warranty Service Priority List" is as follows:

   Code 1-Life Safety Systems

   a. Fire suppression systems.

   b. Fire alarm system(s).

   Code 1-Air Conditioning Systems

   a. Air conditioning leak in part of the building, if causing damage.

   b. Air conditioning system not cooling properly.

   Code 1 Doors

   a. Overhead doors not operational, causing a security, fire or safety problem.

b. Interior, exterior personnel doors or hardware, not functioning properly, causing security, fire or safety problem.

Code 1-Electrical

a. Power failure (entire area or any building operational after 1600 hours).

b. Security lights.

c. Smoke detectors.

Code 2-Electrical

a. Power failure (no power to a room or part of building).

b. Receptacles and lights not operational (in a room or part of building).

Code 1-Gas

a. Leaks and pipeline breaks.

Code 1-Heat

a. Power failure affecting heat.

Code 1-Plumbing

a. Hot water heater failure.

b. Leaking water supply pipes.

Code 3-Interior

a. Floors damaged.

b. Paint chipping or peeling.

c. Casework damaged.

Code 1-Roof Leaks

a. Damage to property is occurring.

Code 3

a. All work not listed above.

E. Warranty Tags: At the time of installation, tag each warranted item with a durable, oil and water-resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Warranty Tags	
Type of product/material	
Model number	
Serial number	

Warranty Tags	
Contract number	
Warranty period from/to	
Inspector’s signature	
Construction Contractor	
Address	
Telephone number	
Warranty Contact	
Address	
Telephone number	
Warranty response time priority code	

1.13 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on Raymond G. Murphy VA Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.

C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.14 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to written approval and compliance with the following provisions:

1. Permission to use each unit or system must be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations.* Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.

B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.

C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

D. Any damage to the equipment or excessive wear due to prolonged use will be repaired replaced by the contractor at the contractor’s expense.

1.15 TEMPORARY USE OF EXISTING ELEVATORS

A. Contractor will not be allowed the use of existing elevators. Outside type hoist shall be used by Contractor for transporting materials and equipment.

B. Use of existing elevators for handling building materials and Contractor's personnel will be permitted subject to following provisions:

1. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Contractor may use elevators Nos. P1-P4 and S-S4 in Building Nos. 41 and 10 when scheduled for upgrade between the hours of 7am and 3:30pm and for special nonrecurring time intervals when permission is granted. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.
2. Contractor covers and provides maximum protection of following elevator components:
   a. Entrance jambs, heads soffits and threshold plates.
   b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
   c. Finish flooring.
3. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes at the contractor’s expense.
4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining at the contractor’s expense.
5. All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts at the contractor’s expense, if recommended by elevator inspector after elevator is released by Contractor.

6. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by Contracting Officer.

1.16 TEMPORARY USE OF NEW ELEVATORS

A. The Contractor and his personnel shall be permitted use of new elevator(s) subject to the following provisions:

1. Contractor shall make arrangements with the COR for use of elevator(s). Contractor may obtain elevator(s) for exclusive use.
2. Prior to the use of elevator(s), the Contractor shall have the elevator(s) inspected and accepted by an ASME accredited, certified elevator safety inspector. The acceptance report shall be submitted to the COR.
3. Submit to the COR the schedule and procedures for maintaining equipment. Indicate the day or days of the week and total hours required for maintenance. A report shall be submitted to the COR monthly indicating the type of maintenance conducted, hours used, and any repairs made to the elevator(s).
4. The Contractor shall be responsible for enforcing the maintenance procedures as per VA and manufacturers recommendations and requirements.
5. During temporary use of elevator(s) all repairs, equipment replacement and cost of maintenance shall be the responsibility of the Contractor.
6. Personnel for operating elevator(s) shall not be provided by the Department of Veterans Affairs.
7. Contractor shall cover and provide maximum protection of the entire elevator(s) installation.
8. The Contractor shall arrange for the elevator company to perform operation of the elevator(s) so that an ASME accredited, certified elevator safety inspector can evaluate the equipment. The Contractor shall be responsible for any costs of the elevator company.
9. All elevator(s) parts worn or damaged during temporary use shall be removed and replaced with new parts at the contractor’s expense. This shall be determined by an ASME accredited certified elevator safety inspector after temporary use and before acceptance by the Government. Submit report to the COR for approval.

10. Elevator shall be tested as required by the testing section of the elevator(s) specifications before acceptance by the Department of Veterans Affairs. The Contractor shall be responsible for all cost associated with testing and inspection.

1.17 TEMPORARY TOILETS

A. Provide where directed, (for use of all Contractor's workers) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COR, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

A*. Contractor may have for use of Contractor's workers such toilet accommodations as may be assigned to Contractor by Raymond G. Murphy VA Medical Center. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workers. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

1.18 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.

B. The Contractor, at Contractor's expense and in a workmanlike manner, in compliance with code and as satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia and repair restore the infrastructure as required.

C. Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.

D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
   1. Obtain heat by connecting to Raymond G. Murphy VA Medical Center heating distribution system.
      a. Steam is available at no cost to Contractor.

E. Electricity (for Construction and Testing): Furnish all temporary electric services.
   1. Obtain electricity by connecting to the Raymond G. Murphy VA Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

F. Water (for Construction and Testing): Furnish temporary water service.
   1. Obtain water by connecting to the Raymond G. Murphy VA Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection as per code. Water is available at no cost to the Contractor.
   2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COR’s discretion) of use of water from Raymond G. Murphy VA Medical Center system.

G. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished and paid by the Contractor at Contractor's expense.

1.19 NEW TELEPHONE EQUIPMENT

A. The contractor shall coordinate with the work of installation of telephone equipment by others. This work shall be completed before the building is turned over to VA.

1.20 TESTS

A. As per specification section 23 05 93 the contractor shall provide a written testing and commissioning plan complete with component level, equipment level, sub-system level and system level breakdowns. The plan will provide a schedule and a written sequence of what will be tested, how and what the expected outcome will be. This document will be submitted for approval prior to commencing work. The contractor shall document the results of the approved plan and submit for approval with the as built documentation.

B. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.

C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

D. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.

E. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.

F. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.21 INSTRUCTIONS

A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is

satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.22 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government-furnished property shown on the drawings.

B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at the Raymond G. Murphy VA Medical Center.

C. Contractor shall be prepared to receive this equipment from Government and store or place such equipment not less than 90 days before Completion Date of project.

D. Storage space for equipment will be provided by the Government and the Contractor shall be prepared to unload and store such equipment therein upon its receipt at the Raymond G. Murphy VA Medical Center.

Notify Contracting Officer in writing, 60 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.
2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.

E. Equipment furnished by the Government will be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e., couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to

make the connection between the Government furnished equipment item and the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.

F. Completely assemble and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.

G. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer.

1.23 RELOCATED EQUIPMENT

A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment or items indicated by symbol "R" or otherwise shown to be relocated by the Contractor.

B. Perform relocation of such equipment or items at such times and in such a manner as directed by the COR.

C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, at the main whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".

D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

E. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

1.24 CONSTRUCTION SIGN

A. Provide Interior Construction Sign where directed by the COR.

1.25 SAFTEY RECORD

A. Post the number of accident free days on a daily basis.

1.26 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide photographic documentation of construction progress and at selected milestones including electronic indexing, navigation, storage and remote access to the documentation, as per these specifications

B. Photographic documentation elements:

1. Each digital image shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) capable of producing 200x250mm (8 x 10 inch) prints with a minimum of 2272 x 1704 pixels and 400x500mm (16 x 20 inch) prints with a minimum 2592 x 1944 pixels.
2. Indexing and navigation system shall utilize actual AUTOCAD construction drawings, making such drawings interactive on an on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the project.
3. Documentation shall combine indexing and navigation system with inspection-grade digital photography designed to capture actual conditions throughout construction and at critical milestones. Documentation shall be accessible on-line through use of an internet connection. Documentation shall allow for secure multiple-user access, simultaneously, on-line.
4. Before construction, the building pad, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building pad and site shall be documented. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings. If site work or pad preparation is extensive, this documentation may be required immediately before construction and at several pre-determined intervals before building work commences.
5. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every thirty (30) calendar days (“Progressions”). Progression documentation shall track both the exterior and interior construction of the building. Exterior Progressions shall track 360 degrees around the site and each building. Interior Progressions shall track interior improvements beginning when stud work commences and continuing until Project completion.
6. As-built condition of pre-foundation utilities and site utilities shall be documented prior to pouring footers, placing concrete and/or backfilling. This process shall include all underground and

in-slab utilities within the building(s) envelope(s) and utility runs in the immediate vicinity of the building(s) envelope(s). This may also include utilities enclosed in slab-on-deck in multi-story buildings. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive site utility plans.

7. As-built conditions of mechanical, electrical, plumbing and all other systems shall be documented post-inspection and pre-insulation, sheet rock or dry wall installation. This process shall include all finished systems located in the walls and ceilings of all buildings at the Project. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
8. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the COR in order to capture pre-determined focal points, such as waterproofing, window flashing, radiused steel work, architectural or Exterior Insulation and Finish Systems (EIFS) detailing. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive elevations or elevation details.
9. As-built finished conditions of the interior of each building including floors, ceilings and walls shall be documented at certificate of occupancy or equivalent, or just prior to occupancy, or both, as directed by the COR. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
10. Miscellaneous events that occur during any Contractor site visit, or events captured by the Department of Veterans Affairs independently, shall be dated, labeled and inserted into a Section in the navigation structure entitled “Slideshows,” allowing this information to be stored in the same “place” as the formal scope.
11. Customizable project-specific digital photographic documentation of other details or milestones. Indexing and navigation accomplished through interactive architectural plans.
12. Monthly (29 max) exterior progressions (360 degrees around the project) and slideshows (all elevations and building envelope). The

slideshows allow for the inclusion of Department of Veterans Affairs pictures, aerial photographs, and timely images which do not fit into any regular monthly photo document.

13. Weekly (21 Max) Site Progressions - Photographic documentation capturing the project at different stages of construction. These progressions shall capture underground utilities, excavation, grading, backfill, landscaping and road construction throughout the duration of the project.
14. Regular (8 max) interior progressions of all walls of the entire project to begin at time of substantial framed or as directed by the COR through to completion.
15. Detailed Exact-Built of all Slabs for all project slab pours just prior to placing concrete or as directed by the COR.
16. Detailed Interior exact built overlapping photos of the entire building to include documentation of all mechanical, electrical and plumbing systems in every wall and ceiling, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by COR.
17. Finished detailed Interior exact built overlapping photos of all walls, ceilings, and floors to be scheduled by COR prior to occupancy.
18. In event a greater or lesser number of images than specified above are required by the COR, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4).

C. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.

D. Coordination of photo shoots is accomplished through COR. Contractor shall also attend construction team meetings as necessary. Contractor’s operations team shall provide regular updates regarding the status of the documentation, including photo shoots concluded, the availability of new Progressions or Exact-Builts viewable on-line and anticipated future shoot dates.

E. Contractor shall provide all on-line domain/web hosting, security measures, and redundant server back-up of the documentation.

F. Contractor shall provide technical support related to using the system or service.

G. Upon completion of the project, final copies of the documentation (the "Permanent Record") with the indexing and navigation system embedded (and active) shall be provided in an electronic media format, typically a DVD or external harddrive. Permanent Record shall have Building Information Modeling (BIM) interface capabilities. On-line access terminates upon delivery of the Permanent Record.

1.27 FINAL ELEVATION DIGITAL IMAGES

A. A minimum of four (4) images of each elevation shall be taken with a minimum 6 MP camera, by a professional photographer with different settings to allow the COR to select the image to be printed. All images are provided to the RE on a CD.

B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures. Pictures shall be 400 mm x 500 mm (16 by 20 inches), printed on regular weight paper, matte finish archival grade photographic paper and produced by a RA4 process from the digital image with a minimum 300 PPI. Identifying data shall be carried on label affixed to back of photograph without damage to photograph and shall be similar to that provided for final construction photographs.

C. Furnish six (6) 400 mm x 500 mm (16 by 20 inch) color prints of the following buildings constructed under this project (elevations as selected by the RE from the images taken above). Photographs shall be artistically composed showing full front elevations. All images shall become property of the Government. Each of the selected six prints shall be place in a frame with a minimum of 2 inches of appropriate matting as a border. Provide a selection of a minimum of 3 different frames from which the SRE will select one style to frame all six prints. Photographs with frames shall be delivered to the COR in boxes suitable for shipping.

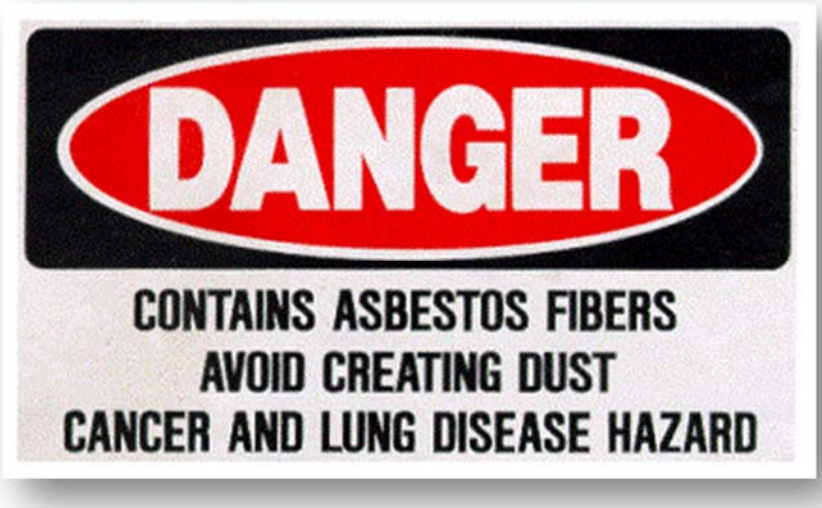
1. Hospital Building No. 41 Elevator Lobby Area and Building No. 41 machine room.

1.28 HISTORIC PRESERVATION

A. Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor

shall immediately notify the COR verbally, and then with a written follow up.

---END---



Asbestos Operations and Maintenance (O&M) Plan

Prepared for:
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number: GS-10F-0328R
Order Number: VA258-Q-0471

Included Buildings:
10, 10A, 41, 42, 43, 43A, 45, 46, 49, 49A, 50, 51, 52, 53, 54, 55, 56, 64, 66, 67, 67A, 94, T3, T15C, T15D, T51, T60, T71, T72, T73, and T74

MEC^X Project Number: 1244.019C.00

Prepared by:
MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

TDSHS MAC # 0218

16 January 2016

TABLE OF CONTENTS

Section *Page*

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 2
1.1 ASBESTOS MANAGEMENT GOAL 3
1.2 DISCLAIMER 3

2.0 IDENTIFIED ASBESTOS CONTAINING MATERIAL 4
2.1 BUILDING 41 ASBESTOS-CONTAINING MATERIALS 4
2.2 BUILDING 10 ASBESTOS-CONTAINING MATERIALS 5
2.3 BUILDING 10A ASBESTOS-CONTAINING MATERIALS 5
2.4 BUILDING 42 ASBESTOS-CONTAINING MATERIALS 5
2.5 BUILDING 43 ASBESTOS-CONTAINING MATERIALS 5
2.6 BUILDING 43A ASBESTOS-CONTAINING MATERIALS 5
2.7 BUILDING 45 ASBESTOS-CONTAINING MATERIALS 6
2.8 BUILDING 46 ASBESTOS-CONTAINING MATERIALS. 6
2.9 BUILDING 49 & 49A ASBESTOS-CONTAINING MATERIALS 6
2.10 BUILDING 50 ASBESTOS-CONTAINING MATERIALS 6
2.11 BUILDING 51 ASBESTOS-CONTAINING MATERIALS 6
2.12 BUILDING 52 ASBESTOS-CONTAINING MATERIALS 6
2.13 BUILDING 53 ASBESTOS-CONTAINING MATERIALS 6
2.14 BUILDING 54 ASBESTOS-CONTAINING MATERIALS 8
2.15 BUILDING 55 ASBESTOS-CONTAINING MATERIALS 8
2.16 BUILDING 56 ASBESTOS-CONTAINING MATERIALS 8
2.17 BUILDING 66 ASBESTOS-CONTAINING MATERIALS 8
2.18 BUILDING 67 ASBESTOS-CONTAINING MATERIALS 8
2.19 BUILDING 67A ASBESTOS-CONTAINING MATERIALS 8
2.20 BUILDING 94 ASBESTOS-CONTAINING MATERIALS 8
2.21 BUILDING T74 ASBESTOS-CONTAINING MATERIALS 9
2.22 BUILDING 15C ASBESTOS-CONTAINING MATERIALS 9

TABLE OF CONTENTS (CONTINUED)

Section *Page*

2.23 BUILDING T15D ASBESTOS-CONTAINING MATERIALS 9
2.24 BUILDING T60 ASBESTOS-CONTAINING MATERIALS 9
2.25 BUILDING T72 ASBESTOS-CONTAINING MATERIALS 9
2.26 BUILDING T3 ASBESTOS-CONTAINING MATERIALS 9
2.27 BUILDING T51 ASBESTOS-CONTAINING MATERIALS 9
2.28 BUILDING T71 ASBESTOS-CONTAINING MATERIALS 10
2.29 BUILDING T73 ASBESTOS-CONTAINING MATERIALS 10
3.0 CONDITION OF CONFIRMED/ASSUMED ACM 11
3.1 DAMAGED MATERIALS OBSERVED 11

4.0 ASBESTOS MANAGEMENT PROGRAM ORGANIZATION 12
4.1 ASBESTOS PROGRAM MANAGER AND FACILITY ASBESTOS PROGRAM COORDINATOR .. 12
4.2 ASBESTOS CONSULTANT 12
4.3 ASBESTOS CONTRACTOR 13
4.4 PROPERTY MANAGEMENT EMPLOYEES 13
4.5 OCCUPANTS 13
4.6 OUTSIDE CONTRACTORS PERFORMING NON-ASBESTOS-RELATED JOB ACTIVITIES 13

5.0 EDUCATION AND TRAINING 14
5.1 SUMMARY OF AWARENESS TRAINING 14

6.0 PERSONAL PROTECTION AND WORK PRACTICE CONTROL TRAINING 15

7.0 RESPIRATORY PROTECTION PROGRAM 16

8.0 MEDICAL SURVEILLANCE PROGRAM 17

9.0 WORK CONTROLS AND PRACTICES 18
9.1 INTRODUCTION 18
9.2 PROHIBITED ACTIVITIES 18
9.3 EMERGENCY PROCEDURES 19

10.0 WORK ACTIVITIES 20

TABLE OF CONTENTS (CONTINUED)

Section *Page*

10.1 SCOPE OF OPERATIONS AND MAINTENANCE WORK ACTIVITIES 20
10.2 SAFETY EQUIPMENT 21

11.0 ASBESTOS O&M EMERGENCY KIT 22

12.0 SAFE WORK PROCEDURES 23
12.1 INTRODUCTION 23
12.2 GENERAL AND SPECIFIC ASBESTOS-RELATED WORK PROCEDURES 23

13.0 PROCEDURES INVOLVING RESILIENT ASBESTOS FLOORING 24
13.1 MAINTENANCE OF RESILIENT ASBESTOS FLOORING 24

14.0 ACM/PACM WASTE HANDLING 25

15.0 AIR MONITORING 26

16.0 PERIODIC SURVEILLANCE 27

17.0 DOCUMENTATION AND RECORD KEEPING 28

18.0 PLAN CERTIFICATION 29

19.0 EXAMPLE NOTICE FORMS 30
19.1 EXAMPLE NOTICE #1 - OUTSIDE SERVICE COMPANY REPRESENTATIVE NOTICE 30
19.2 EXAMPLE NOTICE # 2 - OUTSIDE SERVICE COMPANY REPRESENTATIVE NOTICE 31
19.3 EXAMPLE SAMPLE NOTICE #3 – OCCUPANT NOTIFICATION LETTER 32

APPENDICES

APPENDIX A: Photographs, Report and Tables of Asbestos-Containing Material
APPENDIX B: Asbestos Project Documentation Forms
Form M-1 Report of Damaged Asbestos-Containing Material
Form M-2 Periodic Surveillance
APPENDIX C: Applicable Regulatory Requirements
APPENDIX D: Glossary of Asbestos Terms
APPENDIX E: Smoking Cessation Information
APPENDIX F: Altec Testing & Engineering Asbestos Survey Report & O&M Plan

ACRONYMS

Acronym	*Page first used*
A	
Asbestos-containing materials (ACM)	8
M	
MEC^X, Inc. (MEC^X)	11
Model Accreditation Program (MAP)	18
N	
National Emission Standards for Hazardous Air Pollutants (NESHAP)	11
O	
Occupational Safety & Health Administration (OSHA)	11
Operations and Maintenance (O&M)	8
T	
Texas Department of State Health Services (TDSHS)	11
U	
United States Environmental Protection Agency (USEPA)	9
V	
Veterans Administration Medical Center (VAMC)	8

EXECUTIVE SUMMARY

MEC^X documented asbestos-containing materials (ACM) within select structures at the Raymond G. Murphy Veterans Administration Medical Center (VAMC) located at 1501 San Pedro SE in Albuquerque, New Mexico. MEC^X identified the asbestos-containing materials as the result of surveys completed October 2015 in Buildings 10, 10A, 41, 42, 43, 43A, 45, 46, 49, 49A, 50, 51, 52, 53, 54, 55, 56, 64, 66, 67, 67A, 94, T3, T15C, T15D, T51, T60, T71, T72, T73, and T74. MEC^X designed this Operations and Maintenance (O&M) Program for ACM to provide a management system and standard operating procedures for personnel and contractors at the Raymond G. Murphy VAMC who may encounter asbestos-containing building materials. The O&M Plan provides detailed work practices and management guidelines to assist personnel and contractors in safely controlling the hazards from asbestos-containing materials and to comply with local, state, and federal regulations on asbestos.

MEC^X surveyed the above mentioned buildings located on the Raymond G. Murphy VAMC campus between September and October of 2015. Altec Testing & Engineering, Inc. (Altec) performed an asbestos survey dated November 9-13, 2009; covering buildings 1, 1-Annex, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 18, 32, 33, 39, 57, 58, 60, 61, 62, 63, 65, T35, T35A, T38A, T38B, T46 & T59. Altec additionally generated an Asbestos-Containing Materials Operation & Maintenance (O&M) Plan for the buildings relating to their survey. Appendix F contains a copy of the Altec Asbestos Survey and O&M report.

1.0 INTRODUCTION

The United States Environmental Protection Agency (USEPA) published a guidance document in July 1990, entitled, "Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials." The document's purpose is to assist building owners in identifying and enacting appropriate asbestos controls and abatement activities within their building(s) in an on-going effort to prevent asbestos exposure to building occupants, maintenance personnel and renovation contractors. The document also attempts to place the "potential hazard and risk of asbestos exposure in proper perspective." Listed within the document are the following facts:

- "Although asbestos is hazardous, the risk of asbestos-related disease depends upon exposure to airborne asbestos fibers."
- "Based upon available data, the average airborne asbestos levels in buildings seem to be very low. Accordingly, the health risk to most building occupants also appears to be very low."

The Agency derived these facts from a 1987 USEPA study of the air quality in a segment of Federal buildings as the air quality pertains to asbestos. It concluded that "most building occupants (i.e., those unlikely to disturb asbestos-containing building materials) appear to face only a very slight risk, if any, of developing an asbestos-related disease."

Damage or disturbance to asbestos-containing materials can result in elevated asbestos fiber concentrations and a potential health risk to building occupants.

The damage or disturbance potential is dependent on several factors, namely material condition, disturbance potential and material accessibility.

Controlling these factors and the resultant minimal health risk from implementing these controls, is the ultimate goal of an asbestos management program. The USEPA has instituted the following requirements and recommendations as a method to control the factors discussed above:

- The USEPA requires asbestos removal during building renovation activities if asbestos-containing materials will be impacted in order to prevent significant public exposure to airborne asbestos fibers; and
- The USEPA recommends in-place management programs whenever asbestos-containing material is discovered, in an effort to minimize exposure of building occupants to asbestos fibers. (40 CFR Part 61, Subpart M)

The policies outlined in the USEPA Guidance Document are the basis with which MEC^X developed this asbestos management plan for the Raymond G. Murphy VAMC. These practices include:

- Performing asbestos removal or disturbance activities by qualified, trained and licensed asbestos professionals; and
- Training property management company staff. Appropriate employees should be trained in Asbestos Hazard Awareness to perform proper in-place building management functions.

This document serves as the Asbestos Management Program for the Raymond G. Murphy VAMC and establishes the organizational structure, procedures and guidance policies to be employed by property managers and trades people who are involved with asbestos-related projects. The program incorporates a comprehensive strategy to ensure that building maintenance, repair, renovation and alteration projects are performed in such a manner as to minimize or eliminate airborne asbestos entrainment within the building environment.

Thorough, concise, up-to-date documentation will be maintained by the designated asbestos program manager.

The Asbestos Management Plan addresses the following areas:

- Asbestos Management Program Organization;
- Asbestos Management Goals;
- Asbestos-Containing Materials Evaluation;
- Asbestos Air Monitoring Protocol;
- Communications to Occupants in Occupied areas Which Contain Asbestos;
- Complete Operations and Maintenance Program For Managing Asbestos in Place; and,
- Record Keeping Responsibilities and Requirements.

1.1 ASBESTOS MANAGEMENT GOAL

The goal of the asbestos management plan is to minimize the exposure of building occupants, employees, and contractors to asbestos through accidental exposure by implementing a policy of identification, inspection, control, maintenance and handling of asbestos.

1.2 DISCLAIMER

MEC^X Houston, Texas, developed this O&M Program for ACM specifically for the Raymond G. Murphy VAMC, Albuquerque, New Mexico. This document shall not be used or relied upon by any entity other than their employees, maintenance personnel and contractors performing work at the Raymond G. Murphy VAMC.

This document contains information and advice based on expert opinion and review. However, the information is not a substitute for professional advice regarding the use of this information in the management of asbestos-containing materials in facilities; and the adherence to applicable law, guidance, regulations, practices and procedures. The user of this document waives and releases MEC^X from any and all claims, demands and causes of action for any injury to individuals or property and for any and all financial loss or economic damages sustained by or arising from the user's use of or reliance on this document. Use of this document does not relieve the user from complying with all applicable laws and regulations.

2.0 IDENTIFIED ASBESTOS CONTAINING MATERIAL

This O&M Plan contains the results of limited surveys asbestos containing materials (ACM) completed within select buildings of the Raymond G. Murphy Veterans Administration Medical Center (VAMC) located at 1501 San Pedro Drive SE, Albuquerque, NM 87108 (the Site).

Raymond G. Murphy VAMC retained MEC^X, Inc. (MEC^X) to complete this activity accordance with VA Medical Center Contract GS-10F-0328R Order Number VA256-14-F-0733 awarded December 4, 2013.

MEC^X's representative, Mr. Matthew Haak, a Texas Department of State Health Services (TDSHS) licensed Individual Asbestos Consultant (TDSHS License 10-5791) and James Murray, a TDSHS licensed Individual Asbestos Consultant (TDSHS License 10-5776) completed the surveys in October 2015.

The objective of the asbestos surveys was to perform an inspection sufficient to determine the presence, condition, location and approximate quantity of ACM within specified structures in accordance with the Albuquerque - Bernalillo County Air Quality Control Board (20.11.20.22), United States Environmental Protection Agency (U.S. EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61, Subpart M) regulations and Occupational Safety & Health Administration (OSHA) (29 CFR 1926.1101) worker protection regulations.

Prior to performing sampling, MEC^X completed an in-depth review of asbestos documentation provided by the Raymond G. Murphy VAMC. In accordance with the SOW, MEC^X utilized previously completed building surveys to the fullest extent possible. Prior to conducting the survey, MEC^X reviewed records of previous surveys and abatement projects and MEC^X verified this information and incorporated it into the current survey. MEC^X did not resample previously sampled and/or confirmed ACM in all cases, but MEC^X visually assessed these areas for condition, quantity and location. MEC^X did not resample previously sampled suspect materials that were determined in the prior survey to not be asbestos containing. Preexisting survey reports can be found in Appendix F of this O&M Plan.

Detailed diagrams depicting the location and quantity of ACM are presented within individual survey reports that are included within the appendices of this report.

2.1 BUILDING 41 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- Chilled Water Supply Insulation Mastic/Mastic
- Chilled Water Return Insulation Mastic/Mastic
- Chilled Water Mastic/Mastic
- Hot Water Supply Insulation Mastic/Mastic
- Hot Water Return Insulation Mastic/Mastic
- Heating Water Mastic/Mastic
- Domestic Water Insulation Mastic/Mastic at Hangar at Wall
- White Duct Insulation Mastic/Mastic in Interstitial Spaces
- White Duct Insulation Mastic/Mastic On Air Handler Unit
- Sewer Drain Mastic/Mastic in Interstitial Spaces

- Steam Insulation Mastic/Mastic

2.2 BUILDING 10 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- Steam Hard Fittings & Elbows, White Powder
- White window Caulk

Non-Friable ACM

- Heating (Hot) Water Insulation Mastic/Mastic
- White Chilled Water Return Mastic/Mastic

2.3 BUILDING 10A ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.4 BUILDING 42 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- Domestic Water, Insulation & Mastic/Mastic
- Generator Exhaust Insulation & Mastic/Mastic

2.5 BUILDING 43 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- Boiler Feed Water Insulation & Mastic/Mastic
- Boiler Blow Down Line Insulation & Mastic/Mastic
- Boiler Chemical Feed Line Insulation & Mastic/Mastic
- Steam Header Metals Plate Coating
- Steam Header Bleed Off
- Boiler Feed Water Insulation & Mastic/Mastic
- Boiler Economizer Panel Gasket
- White Condensate Elbow/Fitting Insulation & Mastic/Mastic
- Condensate Tank Insulation & Mastic/Mastic
- Low Pressure Steam Insulation & Mastic/Mastic
- Medium Pressure Steam Insulation & Mastic/Mastic
- White Vent Piping Insulation & Mastic/Mastic

2.6 BUILDING 43A ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.7 BUILDING 45 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.8 BUILDING 46 ASBESTOS-CONTAINING MATERIALS.

Friable ACM

- None

Non-Friable ACM

- 12"x12" White Floor Tile & Black Mastic
- Residual Black Mastic Beneath Carpet Squares In Large Office Area

2.9 BUILDING 49 & 49A ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.10 BUILDING 50 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.11 BUILDING 51 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.12 BUILDING 52 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.13 BUILDING 53 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.14 BUILDING 54 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.15 BUILDING 55 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.16 BUILDING 56 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.17 BUILDING 66 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.18 BUILDING 67 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.19 BUILDING 67A ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.20 BUILDING 94 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.21 BUILDING T74 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.22 BUILDING 15C ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- Black Mirror Mastic

2.23 BUILDING T15D ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.24 BUILDING T60 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.25 BUILDING T72 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.26 BUILDING T3 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.27 BUILDING T51 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.28 BUILDING T71 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

2.29 BUILDING T73 ASBESTOS-CONTAINING MATERIALS

Friable ACM

- None

Non-Friable ACM

- None

3.0 CONDITION OF CONFIRMED/ASSUMED ACM

The majority of the confirmed and assumed asbestos-containing materials appeared to be in good condition at the time of the inspection. Damaged ACM or ACM that becomes damaged should be repaired or removed by a licensed asbestos abatement contractor. A licensed or Model Accreditation Program (MAP) (CFR-2011-Title40-Vol 31-Part763-Subpart E-App C) trained consultant should monitor asbestos abatement activities.

3.1 DAMAGED MATERIALS OBSERVED

- Building 41, TSI (pipe insulation mastic wrap) on mechanical chilled water supply, chilled water return, hot water supply, hot water return and domestic water insulated systems within the mechanical rooms has been documented as asbestos containing. In general, the material was intact; however, MEC^X noted areas of damaged insulation wrap. The material (mastic) was non-friable presenting a low to moderate potential for the release of airborne asbestos fibers.
- Building 10, TSI (pipe insulation mastic wrap) on the hot water insulated systems within the basement mechanical rooms has been documented as asbestos containing. In general, the material was intact; however, MEC^X noted areas of damaged insulation wrap. The material (mastic) was non-friable presenting a low to moderate potential for the release of airborne asbestos fibers.
- Building 43, TSI (pipe insulation mastic wrap) on boiler feed water, boiler blow down line, steam header bleed off, boiler condensate elbow/fitting, low pressure steam and medium pressure steam insulated systems within the boiler plant has been documented as asbestos containing. In general, the material was intact; however, MEC^X noted areas of damaged insulation wrap. The material (mastic) was non-friable presenting a low to moderate potential for the release of airborne asbestos fibers

4.0 ASBESTOS MANAGEMENT PROGRAM ORGANIZATION

4.1 ASBESTOS PROGRAM MANAGER AND FACILITY ASBESTOS PROGRAM COORDINATOR

The Raymond G. Murphy VAMC designated Asbestos Program Manager and Building Asbestos Program Coordinator is Mr. Larry Gutierrez. Mr. Gutierrez can be contacted at (505) 265-1711 Ext. 5276.

Mr. Gutierrez, as the Asbestos Program Manager, will be the final authority in decisions related to asbestos management policy, budgets for asbestos abatement projects and the ongoing O&M program, scheduling asbestos abatement activities and choosing asbestos abatement contractors and consultants.

Mr. Gutierrez, as the Facility Asbestos Program Coordinator, is the central point of communication, implementation and enforcement of the asbestos management program. Specific responsibilities of the Building Asbestos Program Coordinator shall be to maintain asbestos-related documentation; maintain documentation relevant to the asbestos O&M activities; notify building occupants of confirmed and assumed asbestos-containing material locations; coordinate and ensure the proper performance of asbestos O&M activities performed by property management employees and outside general service contractors; ensure that outside contractors are properly trained and qualified to perform O&M activities; coordinate, implement and enforce the appropriate asbestos-related training; ensure the appropriate notifications have been made for asbestos abatement projects; purchase and maintain the appropriate safety equipment for the O&M program; direct questions and requests for asbestos related information; review and update the asbestos O&M program on an annual basis or as regulatory requirements or building conditions change; communicate directly with the Environmental Program Manager to inform him/her of progress regarding asbestos abatement and O&M activities; ensure that appropriate safety equipment is purchased and maintained for the asbestos O&M program; respond to questions regarding asbestos and provide asbestos information; and ensure compliance with applicable federal, state and local regulatory requirements.

The successful implementation of this program should ensure that human health and the environment are protected, asbestos-containing materials are either maintained in good condition or replaced with non-asbestos-containing materials, accidental or uncontrolled disturbances of asbestos-containing materials are prevented or properly cleaned up and the Raymond G. Murphy VAMC complies with local, state and federal regulations.

4.2 ASBESTOS CONSULTANT

Asbestos Consultants, as necessary, provide a variety of technical support services including:

- Building Surveys and Testing of Suspect Materials;
- Abatement Design and Oversight;
- Designing and Monitoring O&M Activities Performed by Outside Contractors; and
- Air Monitoring Support.

4.3 ASBESTOS CONTRACTOR

Asbestos Contractors provide support to the Raymond G. Murphy VAMC by conducting abatement activities and responding to asbestos-related emergencies or maintenance projects involving disturbance of ACM/PACM.

Contractors are expected to conduct abatement projects in accordance with the appropriate contract technical specifications. Contractors must maintain up-to-date training certificates and state licenses. Asbestos Contractors must provide pertinent documentation to the Asbestos Program Coordinator.

4.4 PROPERTY MANAGEMENT EMPLOYEES

All employees with the potential to disturb asbestos will be notified about the presence and location of ACM/PACM. Questions regarding ACM/PACM at the facility must be directed to the Asbestos Program Coordinator.

Training will be provided to employees in accordance with this O&M plan.

4.5 OCCUPANTS

If an asbestos-related O&M activity is scheduled in an occupied area, the Asbestos Program Coordinator will notify the occupant and schedule the activity when the space can be vacated.

If an emergency asbestos O&M activity is required in an occupied area, the Asbestos Program Coordinator will explain the situation to the occupant and request the space be temporarily evacuated for the duration of the activity and subsequent abatement.

Occupants must report to the Asbestos Program Coordinator dust or debris that might come from ACM/PACM, change in ACM/PACM condition, or improper actions of building occupants relative to ACM/PACM.

4.6 OUTSIDE CONTRACTORS PERFORMING NON-ASBESTOS-RELATED JOB ACTIVITIES

The Asbestos Program Coordinator will communicate the requirements of this O&M program to outside contractors who perform job activities in areas where ACM/PACM is present.

If the ACM/PACM is damaged or disturbed, the outside contractor must stop work, limit access to the area and inform the Asbestos Program Coordinator who will determine the necessary response action.

Outside contractors performing non-asbestos-related jobs must avoid impacting ACM/PACM during their job activities.

Questions regarding ACM/PACM may be directed to the Asbestos Program Coordinator.

5.0 EDUCATION AND TRAINING

5.1 SUMMARY OF AWARENESS TRAINING

An asbestos training program plays an important role in a building's O&M program. The general goal of the training program is to inform and educate property management employees with respect to the hazards associated with ACM/PACM in a building. This will help to minimize/eliminate the release of airborne asbestos fibers and to subsequently reduce the risk of employee exposure. The major objectives of the program are to provide the participants with the ability to:

a. Identify the presence and location of ACM/PACM at the facility;
b. Recognize potentially hazardous situations and proper response to incidents involving ACM/PACM;
c. Avoid/minimize intentional/unintentional disturbance of ACM/PACM;
d. Contact appropriate personnel and follow established procedures when asbestos related concerns or emergency situations arise; and
e. Determine when suspect materials should be sampled prior to activities that may disturb ACM/PACM.
f. Understand housekeeping requirements for ACM/PACM.
g. Understand potential health effects of asbestos.

The training program should meet AHERA requirements set forth in 40 CFR 763.92 (a) and will last approximately 2 hours.

6.0 PERSONAL PROTECTION AND WORK PRACTICE CONTROL TRAINING

The Raymond G. Murphy VAMC asbestos O&M program prohibits employees from performing asbestos operations and maintenance work activities that may involve disturbance of ACM/PACM; therefore, personal protection and O&M work practice training is not required. A licensed asbestos abatement contractor must perform work that may impact ACM/PACM.

7.0 RESPIRATORY PROTECTION PROGRAM

The Raymond G. Murphy VAMC asbestos O&M program prohibits employees from performing asbestos operations and maintenance work activities that may involve the disturbance of ACM/PACM; therefore, respiratory protection and personal protective equipment is not required. A licensed asbestos abatement contractor must perform work that may impact ACM/PACM.

8.0 MEDICAL SURVEILLANCE PROGRAM

The Raymond G. Murphy VAMC O&M program prohibits employees from performing asbestos operations and maintenance work activities that may involve the disturbance of ACM/PACM; therefore, a medical surveillance program is not required. A licensed asbestos abatement contractor must perform work that may impact ACM/PACM.

9.0 WORK CONTROLS AND PRACTICES

9.1 INTRODUCTION

The work place controls and practices that have been established in this O&M program apply to employees and non-asbestos abatement contractors working at the Raymond G. Murphy VAMC.

The work place controls and practices that have been developed are based on the job activity conducted and the potential for fiber release resulting from the activity. Work place controls and practices are divided into four Classes. Class 4 activity represents the lowest potential for fiber release. Class 1 represents the highest potential for fiber release. (29 CFR 1926.1101(e)(1))

Job Activity	Description
Class I	Class I asbestos work means activities involving the removal of TSI and surfacing ACM and PACM.
Class II	Class II asbestos work means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
Class III	Class III asbestos work means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed.
Class IV	Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

Employees and outside non-asbestos abatement contractors are prohibited from conducting Class 2 or Class 3 or Class 4 activities. Activities which include drilling, cutting, sanding abrading or otherwise disturbing ACM/PACM, must be performed by licensed asbestos abatement contractors and monitored by a state licensed or MAP trained Asbestos Consultant.
Class 1 activity must only be performed by employees trained in accordance with this O & M program.

9.2 PROHIBITED ACTIVITIES

In addition to those tasks which are outside the scope of this O&M program, the following activities are generally prohibited for facility employees, occupants and outside service contractors. It is important that employees and outside contractors not violate these prohibitions to insure a safe working environment for building occupants and employees. Contact the Asbestos Program Coordinator whenever you have questions about whether a work activity is or is not prohibited.

a. Do not impact ACM/PACM.

b. Do not damage ACM/PACM or allow it to become damaged.

c. Do not attach items to asbestos-containing materials.

d. Do not drill, sand, saw, cut, core or otherwise impact ACM/PACM.

e. Do not dry brush or sweep ACM/PACM.

f. Do not place equipment, furniture or other objects near enough to ACM/PACM so that ACM/PACM might become damaged.

g. Do not use a regular vacuum cleaner to clean asbestos debris.

h. Do not impact asbestos.

i. Do not use ACM/PACM to replace or repair ACM/PACM.

j. No buffing where ACM/PACM is present.

9.3 EMERGENCY PROCEDURES

a. In the event of an asbestos related emergency, accidental or uncontrolled disturbance or release of asbestos from ACM/PACM at Raymond G. Murphy VAMC the following procedures apply. The intent of these procedures is to minimize further release of airborne asbestos fibers by isolation of the area until the Asbestos Program Coordinator obtains a qualified contractor to clean-up and repair the damage.

b. Facility employees or outside contractors who cause or observe damage or disturbance to ACM/PACM should (Class 1 Activity):

   i. Avoid further disturbance of the ACM/PACM.

   ii. Limit access to the area.

   iii. Contact the Asbestos Program Coordinator.

   iv. Complete a "Report of Damaged Asbestos Containing Material" (Form M-1 found in Appendix B).

c. In response to a report of an asbestos-related emergency, accidental or uncontrolled disturbance or release of asbestos from ACM/PACM, the Asbestos Program Coordinator shall:

   i. Obtain a properly qualified asbestos contracted O&M worker or abatement contractor to respond to the hazard.

d. Facility employees will have access to documentation relevant to asbestos-related emergencies in their work areas.

10.0 WORK ACTIVITIES

10.1 SCOPE OF OPERATIONS AND MAINTENANCE WORK ACTIVITIES

a. Only outside contractors who are properly qualified and authorized may conduct Class 2 and Class 3 O&M asbestos activities.

b. Each work activity is assigned a level of protection based on the job activity class and the potential for exposure to asbestos. Work activities not addressed will be assigned a protective level on a case-by-case basis by the Asbestos Program Coordinator. Assignment of protective levels may be revised based on the results of air monitoring data.

c. The general scope of O&M activities conducted by outside contractors may include:

   i. Accessing areas where ACM/PACM is present to conduct routine job activities.
   ii. Performing periodic surveillance of known ACM/PACM.

d. Notifying the Asbestos Program Coordinator of the following:
   i. Changes in ACM/PACM Condition,
   ii. Activities causing or potentially causing damage or disturbance to ACM/PACM,
   iii. Emergency situations involving ACM/PACM
   iv. Situations that would potentially cause the release of airborne asbestos fibers.

e. Responding to emergencies involving ACM/PACM by:
   i. Restricting access to the area,
   ii. Modifying air handling system and creating barriers to prevent the release of airborne asbestos to other areas of the building (if applicable),
   iii. Notifying the Asbestos Program Coordinator of the emergency situation.
   iv. Performance of routine or emergency small-scale, short-duration asbestos work that may disturb minor amounts of ACM/PACM is not permitted by facility employees.

f. Property management will utilize properly qualified contractors to conduct scheduled or emergency asbestos-related jobs.

10.2 SAFETY EQUIPMENT

a. An inventory of safety equipment may be maintained and secured in a designated equipment storage area. This safety equipment may be used by trained O&M employees during the performance of routine or emergency asbestos-related O&M job activities that may result in the disturbance of ACM/PACM.

b. The recommended equipment necessary to implement this O&M Program is included in Section 11.

c. Only equipment which has been approved for asbestos-related activities by the Asbestos Program Coordinator may be purchased for this O&M program.

d. Because safety equipment used for asbestos-related activities may be stored with internal contamination and because the equipment must be available for emergency activities, the storage and use of this equipment must be strictly controlled.

e. Asbestos safety equipment may only be used by trained facility workers and only for asbestos-related activities.

f. The Asbestos Program Coordinator or his/her designate will be responsible for purchasing, storing, maintaining and controlling the use of asbestos safety equipment.

11.0 ASBESTOS O&M EMERGENCY KIT

The following equipment and expendable supplies shall be maintained by the Asbestos Program Coordinator as part of the O&M job kit. Specific equipment and supplies that are required to perform each safety procedure described in this program are referenced in Section H, Number 3. Asbestos control and safety equipment will be secured and stored in the designated O&M equipment area.

1. Asbestos danger signs
2. Polyethylene sheeting (6-mil thickness)
3. Water in an airless sprayer (mended water is recommended)
4. Duct tape
5. Asbestos danger signs (required OSHA wording)(29 CFR 1910.100(j)(4)
6. Barrier tape
7. Wetting agent (surfactant)

12.0 SAFE WORK PROCEDURES

12.1 INTRODUCTION

This section contains general and specific work procedures for conducting small-scale short-duration asbestos-related O&M job activities(29 CFR Parts 1910, 1915, and 1926). These work procedures have been developed in accordance with current federal, state and local regulatory requirements and recommendations. The work procedures will be periodically reviewed and updated in accordance with regulatory changes or updates in state of the art work practices.

12.2 GENERAL AND SPECIFIC ASBESTOS-RELATED WORK PROCEDURES

It is not possible to completely identify all employee work activities or situations where asbestos might be impacted or disturbed. However no employee or non-asbestos abatement contractor may intentionally disturb ACM/PACM.

Asbestos work procedures should be performed only by properly trained and authorized outside contractors. Detailed procedures and special equipment must be utilized for work involving ACM/PACM. Contractor's must read written procedures thoroughly before proceeding and should not hesitate to ask questions of the Asbestos Program Coordinator when necessary. Modifications or new procedures shall be prepared and issued as necessary.

All asbestos work must be performed by a licensed asbestos abatement contractor and monitored by a state licensed or MAP trained asbestos consultant.

13.0 PROCEDURES INVOLVING RESILIENT ASBESTOS FLOORING

13.1 MAINTENANCE OF RESILIENT ASBESTOS FLOORING

The following Procedures are "Recommended Interim Guidelines for Stripping/Sanding Asbestos-Containing Floors" as presented by the U.S.E.P.A.

1. Avoid stripping floors. Stripping of resilient asbestos floors should be done as infrequently as possible, perhaps once or twice or less per year depending on circumstances. When this operation is necessary, it must be performed by personnel trained in proper work procedures.
2. The floor should be kept wet during the stripping operation. DO NOT perform dry stripping. Sanding is prohibited.
3. Prior to machine operation, an emulsion of chemical stripper in water is commonly applied to the floor with a mop to soften the wax or finish coat. After stripping and before application of the new wax, the floor should be thoroughly cleaned, while wet.
4. Run the machine at a slow speed (less than 300-rpm), using the least abrasive pad possible to strip wax or finish coat from asbestos-containing floors.
5. Do not over-strip floors. Stop stripping when the old surface coat is removed. Do not operate a floor machine with an abrasive pad on unwaxed or unfinished floors.

14.0 ACM/PACM WASTE HANDLING

Only asbestos abatement contractors monitored by a state licensed or MAP trained asbestos consultant may handle ACM/PACM waste. (29 CFR 1926.1101)

15.0 AIR MONITORING

A state licensed or MAP trained asbestos consultant will determine air monitoring requirements whenever asbestos related work occurs. *(29 CFR 1926.1101)*

16.0 PERIODIC SURVEILLANCE

Following are the steps to be followed for periodic surveillance: (29 CFR 1926.1101)

1. Periodic surveillance is a means to determine if the condition of ACM/PACM has changed.
2. Periodic surveillance at Raymond G. Murphy VAMC will be performed every three years.
3. Form M-2 found in Appendix B will be updated every three years by a state licensed or MAP trained consultant.

17.0 DOCUMENTATION AND RECORD KEEPING

Regulatory standards and liability issues require an employer and/or building owner to maintain records of asbestos-related activities. The Asbestos Program Coordinator is responsible for maintaining and updating documentation related to the O&M Program. Documents detailing O&M activities must be retained, including the following: (29 CFR 1926.1101)

A. Periodic Surveillance - Documentation of periodic surveillance reports delivered by the Asbestos Management Professional shall be maintained indefinitely. Copies shall be attached to the survey report to document changing ACM conditions.

B. Notification of ACM Locations or Asbestos-Related Work - Documentation including written correspondence (notices to contractors), posted signs and conversations shall be maintained indefinitely in accordance with OSHA requirements.

C. Training - Training records shall be maintained for the duration of employment plus thirty years.

D. Survey Report - A survey report, if completed and attachments shall be maintained indefinitely and updated to reflect changes in ACM condition, location or abatement activities. Data to rebut PACM will be maintained for the life of the facility.

E. Asbestos O&M Program - This written O&M program shall be maintained indefinitely or until ACM has been removed from the facility.

F. Asbestos Abatement Documentation - This Asbestos Management Professional's report documenting the safe removal and disposal of ACM will be kept indefinitely.

G. Asbestos Spills/Incident Reports - These reports along with the response from the Asbestos Management Professional will be maintained indefinitely.

18.0 PLAN CERTIFICATION

Certification Signatures

This report was prepared by:

_____
Matthew A. Haak
Individual Asbestos Consultant

19.0 EXAMPLE NOTICE FORMS

19.1 EXAMPLE NOTICE #1 - OUTSIDE SERVICE COMPANY REPRESENTATIVE NOTICE

An asbestos Operations and Maintenance (O&M) Program has been established at the Raymond G. Murphy VAMC located in Albuquerque, New Mexico. The mere presence of Asbestos Containing Material/Presumed Asbestos Containing Material (ACM/PACM) in a building does not constitute a hazard and an O&M program aims to manage in-place asbestos. This O&M program includes precautions to avoid disturbing ACM/PACM. The program also includes safe work procedures for when small amounts of ACM/PACM must be disturbed to perform routine building operations and maintenance activities.

Your cooperation is essential for the implementation of this program. We ask that you become familiar with potential locations of ACM/PACM (a brief summary of the materials is attached) and avoid activities which may disturb them.

The O&M program is available for your review in my office. I am also available for questions or concerns you may have.

Sincerely,

Asbestos Program Coordinator

19.2 EXAMPLE NOTICE # 2 - OUTSIDE SERVICE COMPANY REPRESENTATIVE NOTICE

Asbestos-containing materials have been identified to exist within the Raymond G. Murphy VAMC. The mere presence of Asbestos Containing Material/Presumed Asbestos Containing Material (ACM/PACM) in a building does not constitute a hazard, Property management has established an Operations and Maintenance (O&M) Program to manage in-place asbestos. This O&M program includes precautions to avoid disturbing ACM/PACM. The program also includes safe work procedures for conducting work in areas where ACM/PACM is present and emergency procedures to be followed if ACM/PACM is disturbed during the performance of routine building operations and maintenance activities. ACM/PACM work must be approved by the Building Management Department.

Your cooperation is essential for the implementation of this program. We ask that you become familiar with potential locations of ACM/PACM (a brief summary of the materials is attached) and avoid activities which may disturb them. We have also established a notification/authorization system for activities which may impact ACM/PACM. If you determine that your contracted service may cause you to impact ACM/PACM, contact the Asbestos Program Coordinator prior to initiating the job to ensure the area is either free of ACM/PACM or the ACM/PACM is properly repaired to minimize the potential for disturbance. If your activities in this building will require you to disturb ACM/PACM, you must receive written authorization from the Asbestos Program Coordinator. Your activities, including the use of qualified and protected workers, must comply with applicable regulations and the O&M program.

Please return a signed copy of this letter to acknowledge your understanding of this program and your intent to comply with applicable regulations.

If you have questions regarding the potential to disturb asbestos, please contact the Asbestos Program Coordinator. The O&M program is available for your review in my office. I am also available for questions or concerns you may have.

Sincerely,

Asbestos Program Coordinator

NAME: _____

SIGNATURE: _____ DATE: _____

TITLE: _____

COMPANY: _____

19.3 EXAMPLE SAMPLE NOTICE #3 – OCCUPANT NOTIFICATION LETTER

During the past several years there has been much publicity regarding asbestos-related issues, creating a heightened public awareness of this potential health hazard. Asbestos-containing materials (ACM) were commonly used in building construction until the late 1970s because of their proven insulating and fireproofing properties. The building management hired an environmental consulting firm to identify ACM and Presumed Asbestos Containing Materials (PACM) in this building and a brief summary of their findings is attached.

Because the mere presence of ACM/PACM in a building does not constitute a hazard, Property management has established an Operations and Maintenance (O&M) Program to manage in-place asbestos. This O&M program includes precautions to avoid disturbing ACM/PACM. The program also includes safe work procedures for when small amounts of ACM/PACM must be disturbed to perform routine building operations and maintenance activities.

Your cooperation is essential for the implementation of this program. We ask that you become familiar with potential locations of ACM/PACM and avoid activities which may disturb them. We have also established a notification/authorization system for occupant activities which may impact ACM/PACM. This authorization/notification must be submitted to the building's Asbestos Program Coordinator for approval 30 days before the start of work.

The O&M program is available for your review in my office. I am also available for questions or concerns you may have.

Sincerely,

Asbestos Program Coordinator

APPENDIX A

ASBESTOS SURVEYS

ASBESTOS SURVEY REPORT

For:

New Mexico VA Health Care System (NMVAHCS)
1501 San Pedro SE.
Albuquerque, New Mexico 87108

Covering Buildings:
1, 1-Annex, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 18, 32, 33, 39, 57, 58, 60, 61, 62, 63, 65, T35, T35A, T38A, T38B, T46, T59,

Survey Performed
November 9-13 2009

Altec Project No. 702-2009089
NMVAHCS
VA-258-09-RO-0256/RFQ415792
GS-10F0039S/501-C90478
Contracting Officer Albert Martinez (505) 917-7375

Prepared by:
Altec Testing & Engineering, Inc.
6035 Fremont Street
Riverside, CA 92504
(951) 352-6510

On behalf of:

7 Amato
Mission Viejo, CA 92692
(949) 454-2546

TABLE OF CONTENTS

1.0 INTRODUCTION 3

2.0 SCOPE OF WORK 5
2.1 Inspectors 5
2.2 Survey Description 5

3.0 FINDINGS PER BUILDING 7
3.1 Building 1 7
3.2 Building 1 Annex 12
3.3 Building 2 13
3.4 Building 3 16
3.5 Building 4 20
3.6 Building 5 22
3.7 Building 6 23
3.8 Building 8 24
3.9 Building 9 26
3.10 Building 10 27
3.11 Building 11 29
3.12 Building 12 33
3.13 Building 13 34
3.14 Building 14 36
3.15 Building 15 37
3.16 Building 18 41
3.17 Building 32 43
3.18 Building 33 44
3.19 Building 39 46
3.20 Building 57 48
3.21 Building 58 50
3.22 Building 60 51
3.23 Building 61 52
3.24 Building 62 52
3.25 Building 63 54
3.26 Building 65 56
3.27 Building T35 56
3.28 Building T35A 59
3.29 Building T38A 59
3.30 Building T38B 61
3.31 Building T46 62
3.32 Building T59 63
3.33 Building T61 64

4.0 SUSPECT ACMS – NOT SAMPLED 67
4.1 Underground Cement (Transite) Utilities Pipe 67
4.2 Underground Cement (Transite) Utilities Pipe 67

5.0 GENERAL INFORMATION 68
5.1 Asbestos Definition 68
5.2 Regulatory Overview 68
5.4 Asbestos Analysis 70
5.5 Asbestos Hazard Assessment 70
5.6 Limitations of Inspection 71
5.7 Asbestos Removal 72

ATTACHMENTS:

Appendix A – Sample Summary Spread Sheet

Appendix B – Sample Location Drawings

Appendix C – Laboratory Analytical Results

Appendix D – Chain-of-Custody / Field Data Sheets

Appendix E – Laboratory Certifications

Appendix F – Inspector Certifications

1.0 INTRODUCTION

A comprehensive survey for asbestos-containing materials (ACM) was performed on thirty three (33) buildings within the New Mexico VA Health Care System (NMVAHCS) located at 1501 San Pedro SE in Albuquerque, New Mexico.

Representatives of Altec Testing & Engineering Inc. (Altec) conducted the survey on behalf of Advanced Environmental Services, Inc under the authorization of Mr. Joe Wilson. Altec is located at 6035 Fremont Street, in Riverside, California, 92504, Phone # (951) 352-6510, Fax # (951) 352-6514. The survey was conducted from November 9th-13th, 2009.

Altec conducted the survey in order to meet requirements that are compliant with the United States Environmental Protection Agency (USEPA) National Emissions Standard for Hazardous Air Pollutants (NESHAP), New Mexico Air Quality Bureau (AQB) and the New Mexico Occupational Health and Safety Bureau (OHSB) rules, regulations and guidelines for renovation/demolition.

The following buildings as specified by representatives of the NMVAHCS were included in this survey:

- Building 1 – Psychiatry
- Building 1 – Annex
- Building 2 – VCS- Recreation
- Building 3 – Psychiatry
- Building 4 - Administrative
- Building 5 - Engineering Shops
- Building 6 - Engineering Shops
- Building 8 - Engineering Administration
- Building 9 – Laundry
- Building 10 – Research (excluding North half of 1st floor and 2nd floor throughout)
- Building 11 – Research/PRRTP
- Building 12 – Research
- Building 13 – CWT Beds
- Building 14 – Research
- Building 15 – Rehabilitation
- Building 18 – Regional Counsel
- Building 32 – Gate House
- Building 33 – Engineering Shop
- Building 39 – Education Building
- Building 57 - Veterans Group
- Building 58 – EMS Pest Control
- Building 60 –
- Building 61 – Booster Pump House
- Building 62 – Well Pump House
- Building 63 – Chlorinator House
- Building 65 – Booster Pump House
- T35 – Paint Shop
- T35A – Paint Shop
- T38A – Grounds
- T38B - Grounds
- T46 - Education
- T59 – Veterans Group
- T61 – Credit Union

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

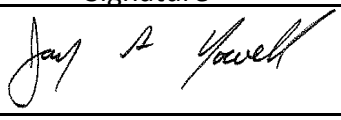
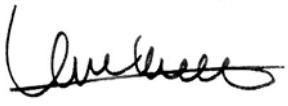
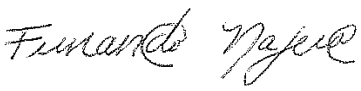
2.0 SCOPE OF WORK

The objective of this survey, as defined by the client, was to collect representative samples of suspect friable and non-friable asbestos-containing materials (ACMs) located in the buildings referenced in Section 1.0 to assess the condition of the suspect materials and to quantify the materials present. The assessment, sampling and subsequent analysis was conducted in order to identify ACMs found within the referenced subject facility.

Suspect ACMs that were found in the subject buildings were assessed, quantified, sampled and submitted for analysis for the determination of asbestos content by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory.

2.1 Inspectors

All of the Altec primary inspectors hold current EPA accreditations in Asbestos Building Inspection, Management Planning, Project Design and Abatement Supervision. Each primary inspector has over 10 years experience in asbestos building inspection and management planning. Altec's primary inspectors are also State of California Department of Occupational Safety and Health (DOSH) Certified Asbestos Consultants (CACs), a licensing/certification program that supersedes EPA's requirements for AHERA accreditation. Part of DOSH's annual re-certification process is a requirement to maintain EPA AHERA accreditation. A Certified Site Surveillance Technician (CSST), who is also EPA AHERA accredited and has 7 years experience, worked under the direction of a CAC during the survey. The inspectors may be contacted at Altec's office in Riverside, California at (909) 352-6510. The following table lists the Altec asbestos inspectors that participated in performing the survey for this facility.

Asbestos Inspector	DOSH Certificate Number	Signature
Jay A Yowell	CAC No. 97-2295	
Howard Baba	CAC No. 95-1791	
Lynn Laborde	CAC No. 92-0495	
Fernando Najera	CSST No. 05-3790	

2.2 Survey Description

Altec collected 1,266 (not including additional layers analyzed by the laboratory) representative bulk samples of all accessible interior suspect asbestos-containing materials. Suspect ACMs may exist in inaccessible or hidden areas of the structure that were not observed or inspected during this investigation. This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures.

A limited survey was conducted on the buildings exteriors in which 181 (not including additional layers analyzed by laboratory) representative bulk samples were collected. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

The quantification of the asbestos-containing materials is an estimate made at the time of sampling. The quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials.

3.0 FINDINGS PER BUILDING

3.1 Building 1

3.1.1 Building 1 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos-containing materials identified within Building 1.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Carpet Glue	4th Floor-Throughout	Category I Non-Friable	Good	5,000 SF
White VFT	4th Floor-Various Locations	Category I Non-Friable	Good	5,000 SF
Black Mastic	4th Floor-Various Locations (below VFT)	Category I Non-Friable	Good	5,000 SF
Yellow Mastic	4th Floor-Various Locations (below VFT)	Category I Non-Friable	Good	5,000 SF
9" Green VFT	4th Floor-Stairwell # 3	Category I Non-Friable	Good	400 SF
Plaster	4th Floor-Throughout	Category II Non-Friable	Good	6,000 SF
2'x4' White Ceiling Tile	4th Floor-Throughout	Friable	Good	5,000 SF
Drywall/Joint Compound	4th Floor-Throughout	Category II Non-Friable	Good	1,700 SF
Cream Base Cove Adhesive	4th Floor-Various Locations	Category I Non-Friable	Good	300 SF
Yellow Carpet Glue	3rd Floor-Various Location	Category I Non-Friable	Good	9,000 SF
White VFT	3rd Floor-Various Location	Category I Non-Friable	Good	9,000 SF
Black Mastic	3rd Floor-Various Locations (below VFT)	Category I Non-Friable	Good	9,000 SF
Yellow Mastic	3rd Floor-Various Locations (below VFT)	Category I Non-Friable	Good	9,000 SF
2'x4' White Ceiling Tile	3rd Floor-Throughout	Friable	Good	10,800 SF
Plaster	3rd Floor-Throughout	Category II Non-Friable	Good	13,000 SF

(Continued Building 1 – Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Drywall/Joint Compound	3rd Floor-Throughout	Category II Non-Friable	Good	8,500 SF
Cream Base Cove Adhesive	3rd Floor-Various Locations	Category I Non-Friable	Good	300 SF
Gray Fireproofing	3rd Floor-Various Locations	Friable	Good	6,500 SF
12" White VFT	3rd Floor-Various Locations	Category I Non-Friable	Good	400 SF
Clear Mastic	3rd Floor-Various Locations (below VFT)	Category I Non-Friable	Good	400 SF
12" Cream VFT	3rd Floor-Various Locations	Category I Non-Friable	Good	400 SF
Yellow Base Cove Adhesive	3rd Floor-Various Locations	Category I Non-Friable	Good	400 SF
12" Tan VFT	3rd Floor-Various Locations	Category I Non-Friable	Good	450 SF
Yellow Carpet Glue	2nd Floor-Various Location	Category I Non-Friable	Good	15,000 SF
Gray Float	2nd Floor-Various Location	Category II Non-Friable	Good	15,000 SF
Black Mastic	2nd Floor-Various Location	Category I Non-Friable	Good	15,000 SF
Yellow Base Cove Adhesive	2nd Floor-Various Location	Category I Non-Friable	Good	600 SF
2'x4' White Ceiling Tile	2nd Floor-Throughout	Friable	Good	15,000 SF
Plaster	2nd Floor-Throughout	Category II Non-Friable	Good	25,000 SF
Drywall/Joint Compound	2nd Floor-Throughout	Category II Non-Friable	Good	42,000 SF
Gray Fireproofing	2nd Floor-Various Location	Friable	Good	6,500 SF
12" White VFT	2nd Floor-Various Location	Category I Non-Friable	Good	6,500 SF
Yellow Mastic	2nd Floor-Various Locations (below VFT)	Category I Non-Friable	Good	6,500 SF
Cream Base Cove Adhesive	2nd Floor-Various Locations	Category I Non-Friable	Good	300 SF

(Continued Building 1 – Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
2'x4' White Ceiling Tile	1st Floor-Throughout	Friable	Good	14,500 SF
Plaster	1st Floor-Throughout	Category II Non-Friable	Good	40,000 SF
Residual 1'x1' Ceiling Tile & Brown Adhesive	1st Floor-Various Locations (above drop ceiling)	Friable	Good	900 SF
Drywall/Joint Compound	1st Floor-Throughout	Category II Non-Friable	Good	60,000 SF
Green Carpet Adhesive	1st Floor-Various Locations	Category I Non-Friable	Good	3,000 SF
White Floor Coating	1st Floor-Various Locations	Category II Non-Friable	Good	3,000 SF
Yellow Base Cove Adhesive	1st Floor-Various Locations	Category I Non-Friable	Good	600 SF
Cream Carpet Glue & Float	1st Floor-Various Locations	Category I Non-Friable	Good	3,500 SF
Yellow Carpet Glue	1st Floor-Various Locations	Category I Non-Friable	Good	14,700 SF
VFT	1st Floor-Various Locations (Below Carpet)	Category I Non-Friable	Good	14,700 SF
Yellow Tile Mastic	1st Floor-Various Locations (Below Carpet)	Category I Non-Friable	Good	14,700 SF
12" Pink VFT	1st Floor-Various Locations	Category I Non-Friable	Good	500 SF
2'x2' Smooth White Ceiling Tile	1st Floor-Throughout	Friable	Good	2,500 SF
12" White VFT	1st Floor-Various Locations	Category I Non-Friable	Good	600 SF
Cream Base Cove Adhesive	1st Floor-Various Locations	Category I Non-Friable	Good	300 SF
1'x1' Ceiling Tile	1st Floor-Lobby Areas	Friable	Good	1,200 SF
Black Ceiling Tile Adhesive	1st Floor-Lobby Areas	Category I Non-Friable	Good	1,200 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified

(Continued Building 1 – Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Exterior Window Putty	Windows	Category I Non-Friable	Good	Not Quantified
2'x4' White Ceiling Tile	Basement-Various-Locations	Friable	Good	10,000 SF
Plaster	Basement-Throughout	Category II Non-Friable	Good	17,500 SF
Drywall/Joint Compound	Basement-Throughout	Category II Non-Friable	Good	35,000 SF
Cream Base Cove Adhesive	Basement-Various Locations	Category I Non-Friable	Good	300 SF
12" Cream VFT (Streaks)	Basement-Various Locations	Category I Non-Friable	Good	6,000 SF
Yellow Mastic	Basement-Various Locations	Category I Non-Friable	Good	6,000 SF
Black Mastic	Basement-Various Locations	Category I Non-Friable	Good	6,000 SF
12" Tan VFT (Speckled)	Basement-Various Locations	Category I Non-Friable	Good	330 SF
12" Rust VFT (Speckled)	Basement-Various Locations	Category I Non-Friable	Good	720 SF
12" White VFT (Tan Speckled)	Basement-Various Locations	Category I Non-Friable	Good	800 SF
Yellow Base Cove Adhesive	Basement-Various Locations	Category I Non-Friable	Good	450 SF
Yellow Carpet Glue	Basement-Various Locations	Category I Non-Friable	Good	15,000 SF
Residual Black Base Cove Adh.	Basement-Various Locations	Category I Non-Friable	Good	40 SF
Residual Brown Base Cove Adh.	Basement-Various Locations	Category I Non-Friable	Good	40 SF
4" Cold Water Pipe Cloth/TSI	Crawl Space	Friable	Good	400 LF
4" Hot Water Pipe Cloth/TSI	Crawl Space	Friable	Good	400 LF
6" Hot Water Pipe Cloth/TSI	Crawl Space	Friable	Good	400 LF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities,

materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

No access was provided to rooms 407C and 308. Flooring material is assumed to be present below hearing booths in rooms A026 and A024.

3.1.2 Building 1 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
506,507	Green 9" VFT & Black Mastic	4th Floor Stairwell # 3	Non-Friable	Good	3-5% Chrysotile
752	VFT below 12" White VFT with Tan Speckles	Basement	Non-Friable	Good	3% Chrysotile
766	Yellow Carpet Glue	Basement A017	Non-Friable	Good	3% Chrysotile

3.1.3 Building 1 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Green 9" VFT & Black Mastic	Category I Non-Friable	40 SF
VFT below 12" White VFT with Tan Speckles	Category I Non-Friable	800 SF
Yellow Carpet Glue	Category I Non-Friable	250 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes.

All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.2 Building 1 Annex

3.2.1 Building 1 - Annex Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Carpet Glue	Opportunities Room	Category I Non-Friable	Good	400 SF
2'x4' White Ceiling Tile	Opportunities Room	Friable	Good	400 SF
Plaster	Opportunities Room	Category II Non-Friable	Good	1,200 SF
Wall Texture	Opportunities Room	Category II Non-Friable	Good	640 SF
Plaster	Education Annex	Category II Non-Friable	Good	2,400 SF
Wall Texture	Education Annex	Category II Non-Friable	Good	1,300 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	4,000 SF
Exterior Window Putty	Windows	Category I Non-Friable	Good	12 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.2.2 Building 1 Annex - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.3 Building 2

3.3.1 Building 2 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
2'x4' White Ceiling Tile (Speckled)	2nd Floor- Various Locations	Friable	Good	1,000 SF
Plaster	2nd Floor- Various Locations	Category II Non-Friable	Good	9,500 SF
Yellow Carpet Glue	2nd Floor- Various Locations	Category I Non-Friable	Good	1,000 SF
9" Red VFT	2nd Floor- Various Locations (below carpet)	Category I Non-Friable	Good	1,000 SF
Black Mastic	2nd Floor- Various Locations (below carpet)	Category I Non-Friable	Good	1,000 SF
Yellow Base Cove Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	50 SF
1'x1' White Ceiling Tile	Balcony Area & above Recreation Area	Friable	Good	8,000 SF
Brown Ceiling Tile Adhesive	Balcony Area & above Recreation Area	Category I Non-Friable	Good	8,000 SF
9" Black VFT	2nd Floor- Stairwell Landing	Category I Non-Friable	Good	40 SF
Clear Base Cove Adhesive	1st Floor- Stairwell Landing	Category I Non-Friable	Good	100 SF
12" White VFT (Gray Speckled)	1st Floor-Various Locations	Category I Non-Friable	Good	8,000 SF
Yellow Adhesive	1st Floor-Various Locations (below VFT)	Category I Non-Friable	Good	8,000 SF

(Continued Building 2 – Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
2'x4' White Ceiling Tile	1st Floor-Various Locations	Friable	Good	8,000 SF
Plaster	1st Floor-Various Locations	Category II Non-Friable	Good	45,000 SF
12" Pink VFT	1st Floor-Various Locations	Category I Non-Friable	Good	900 SF
12" Peach VFT	1st Floor-Various Locations	Category I Non-Friable	Good	500 SF
12"x16" Decorative Ceiling Tile	1st Floor-Dinning Area (Above Drop Ceiling)	Category II Non-Friable	Good	8,000 SF
Brown Ceiling Tile Adhesive	1st Floor-Dinning Area (Above Drop Ceiling)	Category I Non-Friable	Good	8,000 SF
Drywall/Joint Compound	1st Floor-Various Locations	Category II Non-Friable	Good	45,000 SF
Wall Texture	1st Floor- Breezeway	Category II Non-Friable	Good	1,150 SF
12" Green VFT (Gray Speckled)	1st Floor-Auditorium	Category I Non-Friable	Good	2,800 SF
Vapor Barrier	1st Floor-Auditorium (below VFT)	Category I Non-Friable	Good	2,800 SF
Black Adhesive	1st Floor-Auditorium (below VFT)	Category I Non-Friable	Good	2,800 SF
Black Adhesive	1st Floor-Auditorium (below VFT)	Category I Non-Friable	Good	2,800 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified
8" Tan Pipe Cover & TSI	Basement- Crawl Space	Friable	Good	100 LF
6" Tan Pipe Cover & TSI	Basement- Crawl Space	Friable	Good	100 LF
4" Tan Pipe Cover & TSI	Basement- Crawl Space	Friable	Good	100 LF
Plaster	Basement	Category II Non-Friable	Good	600 SF
Black Mirror Mastic	Basement Closet	Category I Non-Friable	Good	5 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities,

materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

No access was provided to room 104, behind the stage and rooms 110 A&B.

3.3.2 Building 2 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
1116, 1124-25 1133-34	9" Red & 9" Black VFT	2nd Floor	Non-Friable	Good	3-4% Chrysotile
1152, 1154, 1156, 1170, 1201	Black & Yellow Adhesive Below Various VFT	Throughout 1st floor hallway & dining room	Non-Friable	Good	2-15% Chrysotile

3.3.3 Building 2 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
9" Red & 9" Black VFT	Category I Non-Friable	1,400 SF
Black & Yellow Adhesive	Category I Non-Friable	10,000 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes.

All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.4 Building 3

3.4.1 Building 3 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
12" Cream VFT (Speckled)	Penthouse- Entrance Area	Category I Non-Friable	Good	400 SF
Yellow mastic	Penthouse- Entrance Area (Below VFT)	Category I Non-Friable	Good	400 SF
9" Dark Green VFT	Penthouse- Entrance / Cubical Area	Category I Non-Friable	Good	25 SF
Clear Mastic	Penthouse- Entrance / Cubical Area (Below VFT)	Category I Non-Friable	Good	25 SF
9" Light Green VFT	Penthouse- Cubical Area	Category I Non-Friable	Good	2,050 SF
Clear Mastic	Penthouse- Cubical Area	Category I Non-Friable	Good	2,050 SF
Plaster	Penthouse- Various Locations	Category II Non-Friable	Good	5,000 SF
2'x4' White Ceiling Tile	Penthouse- Throughout	Friable	Good	2,500 SF
Drywall/Joint Compound	Penthouse- Restroom 302	Category II Non-Friable	Good	500 SF
Gray Vibration Dampener	Penthouse- Mechanical Room	Category II Non-Friable	Good	40 SF
Gray Exterior Stucco	Penthouse- Mechanical Room	Category II Non-Friable	Good	500 SF
9" Dark Green VFT	2nd Floor- Various Locations	Category I Non-Friable	Good	300 SF
Black Mastic	2nd Floor- Various Locations	Category I Non-Friable	Good	5,000 SF
12" Peach VFT (White Speckles)	2nd Floor- Various Locations	Category I Non-Friable	Good	16,500 SF
Yellow Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	16,500 SF

(Continued-Building 3 Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
2'x4' White Ceiling Tile	2nd Floor- Various Locations	Friable	Good	20,000 SF
Drywall/Joint Compound	2nd Floor- Various Locations	Category II Non-Friable	Good	45,000 SF
Plaster	2nd Floor- Various Locations	Category II Non-Friable	Good	25,500 SF
Yellow Base Cove Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	600 SF
Tan Fireproofing	2nd Floor- Therapy Room 224	Friable	Good	800 SF
Yellow Carpet Glue	2nd Floor- Various Locations	Category I Non-Friable	Good	4,000 SF
12" Dark Green VFT	2nd Floor- Various Locations	Category I Non-Friable	Good	100 SF
Brown Base Cove Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	50 SF
2'x4' White Ceiling Tile	1st Floor- Various Locations	Friable	Good	2,500 SF
Plaster	1st Floor- Various Locations	Category II Non-Friable	Good	25,500 SF
Drywall/Joint Compound	1st Floor- Various Locations	Category II Non-Friable	Good	45,000 SF
VFC (Gray Pebble)	1st Floor- Various Locations	Category II Non-Friable	Good	80 SF
Yellow Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	4,000 SF
Yellow Base Cove Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	300 SF
12" White VFT (Green Speckles)	1st Floor- Various Locations	Category I Non-Friable	Good	4,000 SF
12" Cream VFT (Speckles)	1st Floor- Various Locations	Category I Non-Friable	Good	100 SF
Black Mastic	1st Floor- Various Locations	Category I Non-Friable	Good	4,000 SF
Wall Texture	1st Floor- Various Locations	Category II Non-Friable	Good	900 SF
12" White VFT (Speckles)	1st Floor- Various Locations	Category I Non-Friable	Good	1,500 SF
12" White VFT (Gray Speckles)	1st Floor- Various Locations	Category I Non-Friable	Good	1,500 SF

(Continued-Building 3 Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Brown Base Cove Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	300 SF
1'x1' White Ceiling Tile	1st Floor- Various Locations	Friable	Good	4,500 SF
Brown Ceiling Tile Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	4,500 SF
12" White VFT	1st Floor- Various Locations	Category I Non-Friable	Good	200 SF
12" Purple VFT	1st Floor- Various Locations	Category I Non-Friable	Good	100 SF
White Float	1st Floor- Various Locations	Category II Non-Friable	Good	100 SF
12" Pink VFT (Streak)	1st Floor- Various Locations	Category I Non-Friable	Good	4,000 SF
12" Light Pink VFT (Streak)	1st Floor- Various Locations	Category I Non-Friable	Good	2,000 SF
VFC (Gray / Blue Pebble)	1st Floor- Various Locations	Category II Non-Friable	Good	600 SF
12" Peach VFT (White Streak)	1st Floor- Various Locations	Category I Non-Friable	Good	2,000 SF
12" Light Green VFT (Black Speckled)	1st Floor- Various Locations	Category I Non-Friable	Good	1,500 SF
Cream Base Cove Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	300 SF
Yellow Carpet Glue	1st Floor- Various Locations	Category I Non-Friable	Good	280 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified
Exterior Window Putty	Exterior Walls	Category II Non-Friable	Good	Not Quantified

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.4.2 Building 3 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
871,873, 875	12'' Cream VFT (Speck)	Penthouse	Non-Friable	Good	6-8% Chrysotile
877,879, 881	9" Dark Green VFT	Penthouse	Non-Friable	Good	5-7% Chrysotile
883,885, 887	9" Light Green VFT	Penthouse	Non-Friable	Good	5-7% Chrysotile
900,902, 904	9" Dark Green VFT	2nd floor Stairs (248)	Non-Friable	Good	4-5% Chrysotile
926	Yellow Carpet Glue	Rm. 224	Non-Friable	Good	6% Chrysotile
927	Black Mastic	Rm. 224 (below carpet)	Non-Friable	Good	6% Chrysotile
928	9" Dark Green VFT	Stairs near room 220	Non-Friable	Good	3% Chrysotile
929	Black Mastic	Stairs near room 220	Non-Friable	Good	2% Chrysotile
933	Black Mastic	Below carpet near room 221	Non-Friable	Good	4% Chrysotile
953	Black Mastic	Below 12” white VFT by room 168	Non-Friable	Good	4% Chrysotile
956,958, 960	12” Cream VFT (Specks)	Stairs (163)	Non-Friable	Good	2% Chrysotile
981,983	12” White VFT & Black Mastic	Room 142 (Electrical Area)	Non-Friable	Good	3-4% Chrysotile
1012-1018	9" Light Green VFT & Black Mastic	1st Floor	Non-Friable	Good	2-7% Chrysotile

3.4.3 Building 3 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
12'' Cream VFT (Speck)	Category I Non-Friable	500 SF
9" Dark Green VFT	Category I Non-Friable	425 SF
9" Light Green VFT	Category I Non-Friable	3,550 SF
Yellow Carpet Glue	Category I Non-Friable	4,000 SF
Black Mastic	Category I Non-Friable	10,000 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the

removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.5 Building 4

3.5.1 Building 4 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow / Black Carpet Glue	2nd Floor- Various Locations	Category I Non-Friable	Good	10,000 SF
Yellow Base Cove Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	300 SF
2'x2' White Ceiling Tile	2nd Floor- Various Locations	Friable	Good	300 SF
Plaster	2nd Floor- Various Locations	Category II Non-Friable	Good	9,500 SF
Drywall/Joint Compound	2nd Floor- Various Locations	Category II Non-Friable	Good	20,000 SF
12" Beige VFT (Speckled)	2nd Floor- Various Locations	Category I Non-Friable	Good	400 SF
2'x4' White Ceiling Tile	2nd Floor- Various Locations	Friable	Good	10,200 SF

(Continued-Building 4 Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Cream Base Cove Adhesive	2nd Floor- Various Locations	Category I Non-Friable	Good	400 SF
Yellow / Black Carpet Glue	1st Floor- Various Locations	Category I Non-Friable	Good	10,000 SF
Yellow Base Cove Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	800 SF
2'x2' White Ceiling Tile	1st Floor- Various Locations	Friable	Good	2,000 SF
Plaster	1st Floor- Various Locations	Category II Non-Friable	Good	9,500 SF
Drywall/Joint Compound	1st Floor- Various Locations	Category II Non-Friable	Good	20,000 SF
12" Beige VFT (Speckled)	1st Floor- Various Locations	Category I Non-Friable	Good	400 SF
2'x4' White Ceiling Tile	1st Floor- Various Locations	Friable	Good	8,000 SF
Cream Base Cove Adhesive	1st Floor- Various Locations	Category I Non-Friable	Good	400 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified
Exterior Window Putty	Windows	Category II Non-Friable	Good	Not Quantified

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.5.2 Building 4 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were

sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.6 Building 5

3.6.1 Building 5 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Base Cove Adhesive	Offices	Category I Non-Friable	Good	100 SF
Vinyl Floor Tile (VFT) with Yellow & Black Mastic	Offices	Category I Non-Friable	Good	1,500 SF
2'x4' Ceiling Tile	Offices	Friable	Good	1,400 SF
Drywall/Joint Compound	Throughout	Category II Non-Friable	Good	2,600 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	3,000 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.6.2 Building 5 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the

roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.7 Building 6

3.7.1 Building 6 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Carpet Glue	Engineering-Throughout	Category I Non-Friable	Good	660 SF
2'x4' White Ceiling Tile	Engineering-Throughout	Friable	Good	700 SF
Cream Base Cove Adhesive	Engineering-Throughout	Category I Non-Friable	Good	75 SF
Drywall/Joint Compound	Engineering-Throughout	Category II Non-Friable	Good	4,000 SF
12" White VFT (Gray Streaks)	Carpenter Shop-Offices	Category I Non-Friable	Good	600 SF
Yellow Mastic	Carpenter Shop-Offices	Category I Non-Friable	Good	600 SF
Yellow Base Cove Adhesive	Carpenter Shop-Offices	Category I Non-Friable	Good	80 SF
Brown Base Cove Adhesive	Carpenter Shop-Break Room	Category I Non-Friable	Good	30 SF
Drywall/Joint Compound	Carpenter Shop-Offices	Category II Non-Friable	Good	1,350 SF
Plaster	Carpenter Shop-Restroom	Category II Non-Friable	Good	360 SF
Wall / Floor Coating	Water Softener Room	Category I Non-Friable	Good	1,300 SF
Black Wall Adhesive	Booster Pump Room	Category I Non-Friable	Good	600 SF
TSI	Water Softener Room	Friable	Damaged	20 LF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	3,000 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive

measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.7.1 Building 6 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.8 Building 8

3.8.1 Building 8 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
2'x4' White Ceiling Tile	Office Area-Various Locations	Friable	Good	3,000 SF
2'x4' Cream Ceiling Tile	Office Area-Various Locations	Friable	Good	500 SF
12" White VFT (Speckled)	Cubical Area (some under Carpet)	Category I Non-Friable	Good	2,000 SF
Black Mastic	Cubical Area	Category I Non-Friable	Good	3,000 SF
Yellow Carpet Glue	Office Area-Various Locations	Category I Non-Friable	Good	1,000 SF
VFT	Office Area-Various Locations (below carpet)	Category I Non-Friable	Good	1,000 SF

(Continued-Building 8 Suspect Asbestos-Containing Materials)

Material Description	Material Location	EPA Category	Condition	Quantity
Cream Base Cove Adhesive	Various Locations	Category I Non-Friable	Good	275 SF
Drywall/Joint Compound	Throughout	Category II Non-Friable	Good	15,000 SF
Plaster	Various Locations	Category II Non-Friable	Good	1,000 SF
Interior Window Putty	Windows	Category II Non-Friable	Good	23 Windows
Cloth Wrap/TSI	Metal & Tool Shop	Friable	Good	250 LF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	6,500 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.8.1 Building 8 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
447,449, 463	Black Mastic below white 12” VFT and carpeted area	Cubicle	Non-Friable	Good	5-8% Chrysotile

3.8.2 Building 8 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Black Mastic below white 12” VFT and carpeted areas	Category I Non-Friable	3,000 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage’s and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.9 Building 9

3.9.1 Building 9 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
12” Gray VFT	Various Locations	Category I Non-Friable	Good	1,900 SF
Black Mastic	Various Locations (Below VFT)	Category I Non-Friable	Good	1,900 SF
Interior Window Putty	Windows	Category II Non-Friable	Good	24 Windows
Cream Base Cove Adhesive	Various Locations	Category I Non-Friable	Good	300 SF
Tan Adhesive	Throughout Area (below rubber flooring)	Category I Non-Friable	Good	14,000 SF
Yellow Carpet Glue	Various Locations	Category I Non-Friable	Good	200 SF
Drywall/Joint Compound	Various Locations	Category II Non-Friable	Good	6,000 SF
2’x4’ White Ceiling Tile	Various Locations	Friable	Good	700 SF
2’x2’ White Ceiling Tile	Various Locations	Friable	Good	500 SF
White HVAC Cloth	Throughout	Category I Non-Friable	Good	Not Quantified
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	16,000 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection

3.9.2 Building 9 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.10 Building 10

3.10.1 Building 10 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building. At the direction of NMVAHCS personnel, Altec Testing & Engineering, Inc. did not perform an inspection of the North section of the 1st floor or any of the 2nd floor.

Material Description	Material Location	EPA Category	Condition	Quantity
12” White VFT	Entrance Room 18	Category I Non-Friable	Good	250 SF
Yellow Adhesive	Entrance Room 18 (Below VFT)	Category I Non-Friable	Good	300 SF
Brown Base Cove Adhesive	Entrance Room 18	Category I Non-Friable	Good	15 SF
Cloth Wrap/TSI	Above Hallway Ceiling, Various Rooms & Crawl Space & Mechanical Rm.	Friable	Some Damage	Not Quantified

(Continued-Building 10 Suspect Asbestos-Containing Materials)

Material Description	Material Location	EPA Category	Condition	Quantity
Black HVAC Tar	Above Hallway Ceiling	Category I Non-Friable	Good	Not Quantified
2'x4' White Ceiling Tile	Hallway	Friable	Good	950 SF
12" Light Green (Streaked) VFT	Various Rooms	Category I Non-Friable	Good	700 SF
Black Mastic (Below VFT)	Various Rooms	Category I Non-Friable	Good	700 SF
12" Cream (Speckled) VFT	Various Rooms	Category I Non-Friable	Good	150 SF
Black/Yellow Mastic (Below VFT)	Various Rooms	Category I Non-Friable	Good	150 SF
Blue Floor Coating	Various Rooms	Category I Non-Friable	Good	1,500 SF
Brown Base Cove Adhesive	Various Rooms	Category I Non-Friable	Good	900 SF
Gray HVAC Expansion Tape	Various Rooms	Category II Non-Friable	Good	200 SF
Plaster	Hard Ceilings	Category II Non-Friable	Good	6,000 SF
Laboratory Counter Tops	Various Rooms	Category II Non-Friable	Good	Not Quantified Not Sampled
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified
Exterior Window Putty	Windows	Category II Non-Friable	Good	Not Quantified

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.10.2 Building 10 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
216-221	12" VFT Lite Green (Streak)	Various Rooms	Non-Friable	Good	3-7% Chrysotile

(Continued-Building 10 Asbestos-Containing Materials)

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
223, 225, 227	Yellow/Black Mastic below 12" Cream VFT	Various Rooms	Non-Friable	Good	2-4% Chrysotile

3.10.3 Building 10 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
12" VFT Lite Green (Streak)	Category I Non-Friable	700 SF
Yellow/Black Mastic below 12" Cream VFT	Category I Non-Friable	150 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.11 Building 11

3.11.1 Building 11 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Plaster	2nd Floor – Throughout	Category II Non-Friable	Good	15,000 SF
2'x4' White Ceiling Tile	2nd Floor – Various Locations	Friable	Good	1,000 SF
TSI 6" Elbow	2nd Floor – Hallway Above Ceiling Tile	Friable	Good	Not Quantified
9" Dark Green VFT	2nd Floor – Various Locations	Category I Non-Friable	Good	1,600 SF
Black Mastic	2nd Floor – Various Locations (Below VFT)	Category I Non-Friable	Good	1,600 SF
9" Light Green VFT	2nd Floor – Various Locations	Category I Non-Friable	Good	1,800 SF
12" White VFT (Light Green Speckles)	2nd Floor – Various Locations	Category I Non-Friable	Good	350 SF
Yellow/Black Mastic	2nd Floor – Various Locations (Below VFT)	Category I Non-Friable	Good	600 SF
12" Tan VFT (Speckles)	2nd Floor – Various Locations	Category I Non-Friable	Good	135 SF
12" White VFT (Gray Speckles)	2nd Floor – Various Locations	Category I Non-Friable	Good	300 SF
2'x4' White Ceiling Tile	2nd Floor – Various Locations	Friable	Good	600 SF
12" Pink VFT (Speckles)	2nd Floor – Various Locations	Category I Non-Friable	Good	250 SF
Yellow Mastic	2nd Floor – Various Locations (Below VFT)	Category I Non-Friable	Good	250 SF
Drywall/Joint Compound	2nd Floor – Various Locations	Category II Non-Friable	Good	500 SF
Cream Base Cove Adhesive	2nd Floor – Various Locations	Category I Non-Friable	Good	25 SF
Drywall/Joint Compound	1st Floor – Various Locations	Category II Non-Friable	Good	500 SF
Cream Base Cove Adhesive	1st Floor – Various Locations	Category I Non-Friable	Good	25 SF
12" Pink VFT (Speckles)	1st Floor – Various Locations	Category I Non-Friable	Good	150 SF

(Continued-Building 11 Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Yellow/Black Mastic	1st Floor – Various Locations	Category I Non-Friable	Good	150 SF
Yellow Carpet Glue	1st Floor – Various Locations	Category I Non-Friable	Good	7,500 SF
VFT (below carpet)	1st Floor – Various Locations	Category I Non-Friable	Good	7,500 SF
Yellow/Black Mastic	1st Floor – Various Locations	Category I Non-Friable	Good	7,500 SF
12" Light Pink VFT (Speckles)	1st Floor – Various Locations	Category I Non-Friable	Good	1,500 SF
Yellow/Black Mastic	1st Floor – Various Locations	Category I Non-Friable	Good	1,500 SF
Plaster	1st Floor – Throughout	Category II Non-Friable	Good	22,000 SF
2'x4' White Ceiling Tile	1st Floor – Various Locations	Friable	Good	7,500 SF
Cloth Wrap/TSI	1st Floor – janitors Closet	Friable	Good	800 LF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	Not Quantified
Exterior Window Putty	Windows	Category II Non-Friable	Good	Not Quantified
12" White VFT (Black Streak)	Basement – Room 3A	Category I Non-Friable	Good	800 SF
Yellow Mastic	Basement – Room 3A	Category I Non-Friable	Good	800 SF
Cloth Wrap/TSI	Basement – Various Locations	Friable	Good	35 Elbows
Plaster	Basement – Various Locations	Category II Non-Friable	Good	10,000 SF
Cloth @ HVAC Duct	Basement – Mechanical Room 201B	Friable	Good	400 SF
Cloth @ 2" Pipe	Basement – Mechanical Room 201B	Friable	Good	30 LF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and

pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.11.2 Building 11 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
786	6" TSI Elbow	Above ceiling tile room 205	Friable	Good	2% Chrysotile
787,789, 791	9" Dark Green VFT	Throughout 2nd Floor	Non-Friable	Good	3-5% Chrysotile
793,795, 797	9" light Green VFT	Throughout 2nd Floor	Non-Friable	Good	4-5% Chrysotile
839	Black Mastic Below 12" Light Pink VFT	1st Floor	Non-Friable	Good	3% Chrysotile
862,863, 869,870	Cloth Jacket & TSI Elbows	Throughout Basement	Friable	Good	2-7% Chrysotile

3.11.3 Building 11 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
6" TSI Elbow	Friable	1 Elbow
9" Dark Green VFT	Category I Non Friable	1,600 SF
9" light Green VFT	Category I Non Friable	1,600 SF
Black Mastic Below 12" Light Pink VFT	Category I Non Friable	1,600 SF
Cloth Jacket & TSI Elbows	Friable	35 Elbows

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the

roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.12 Building 12

3.12.1 Building 12 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Carpet Glue	1st Floor – Copy Room Secretaries Office	Category I Non-Friable	Good	450 SF
Gray VFT	1st Floor – Copy Room	Category I Non-Friable	Good	105 SF
Black/Yellow Mastic	1st Floor – Copy Room	Category I Non-Friable	Good	105 SF
2'x4' White Ceiling Tile	1st Floor – Various Locations	Friable	Good	105 SF
Plaster	Throughout	Category II Non-Friable	Good	8,000 SF
Cream Base Cove Adhesive	1st Floor – Copy Room	Category I Non-Friable	Good	15 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	8,000 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	15 Windows
Cloth Wrap & TSI	Basement	Friable	Good	150 LF
12" White VFT (Streak)	Stairwell Landing	Category I Non-Friable	Good	20 SF
Yellow / Black Mastic	Stairwell Landing	Category I Non-Friable	Good	20 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.12.2 Building 12 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.13 Building 13

3.13.1 Building 13 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow / Brown Carpet Glue	1st Floor – Throughout	Category I Non-Friable	Good	2,200 SF
2'x4' White Ceiling Tile	1st Floor – Throughout	Friable	Good	2,200 SF
Plaster	Throughout	Category II Non-Friable	Good	8,000 SF
Drywall/Joint Compound	1st Floor – Throughout	Category II Non-Friable	Good	700 SF
Yellow Base Cove Adhesive	1st Floor – Throughout	Category II Non-Friable	Good	300 SF
12" Cream VFT (Streak)	Kitchen	Category I Non-Friable	Good	150 SF
Yellow Adhesive	Kitchen	Category I Non-Friable	Good	150 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	8,000 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	22 Windows
Cloth Wrap & TSI	Basement	Friable	Good	150 LF

Cement Sink	Basement	Category II Non-Friable	Good	40 LF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.13.2 Building 13 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.14 Building 14

3.14.1 Building 14 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow / Black Carpet Glue	1st Floor – Throughout	Category I Non-Friable	Good	2,200 SF
Cream Vapor Barrier	1st Floor – Throughout (Below Carpet)	Category II Non-Friable	Good	2,200 SF
Black Adhesive	1st Floor – Throughout (Below Carpet)	Category II Non-Friable	Good	2,200 SF
Cloth material	1st Floor – Throughout (Below Carpet)	Category II Non-Friable	Good	2,200 SF
Plaster	Throughout	Category II Non-Friable	Good	8,000 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	6,000 SF

(Continued-Building 14 Suspect Asbestos-Containing Materials)

Material Description	Material Location	EPA Category	Condition	Quantity
Exterior Window Putty	Windows	Category II Non-Friable	Good	20 Windows
Cloth Wrap & TSI	Basement	Friable	Good	150 LF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.14.2 Building 14 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.15 Building 15

3.15.1 Building 15 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
12” Green VFT (Streak)	Therapy Room	Category I Non-Friable	Damaged	1,800 SF
Black Mastic	Therapy Room	Category I	Damaged	2,500 SF

		Non-Friable		

(Continued-Building 15 Suspect Asbestos-Containing Materials)

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
12" Pink VFT (Streak)	Therapy Room	Category I Non-Friable	Damaged	40 SF
TSI Elbows& Cloth Wrap/TSI	Therapy Room, Basement Former Restroom & Crawl Space	Friable	Good	12 Elbows 500 LF
Yellow/Brown Base Cove Adhesive	Therapy Room	Category I Non-Friable	Damaged	70 SF
12" White VFT (Streak)	Therapy Room	Category I Non-Friable	Damaged	650 SF
Yellow Adhesive	Therapy Room	Category I Non-Friable	Damaged	650 SF
Drywall/Joint Compound	Therapy Room	Category II Non-Friable	Damaged	400 SF
2'x4' White Ceiling Tile	1st Floor – Throughout	Friable	Damaged	2,500 SF
Yellow Carpet Glue	1st Floor – Throughout	Category I Non-Friable	Damaged	2,500 SF
Floor Float Material	1st Floor – Throughout	Category II Non-Friable	Damaged	2,500 SF
Black Mastic	1st Floor – Throughout	Category I Non-Friable	Damaged	2,500 SF
Wall Texture	1st Floor – Throughout	Category II Non-Friable	Damaged	12,000 SF
Drywall/Joint Compound	1st Floor – Throughout	Category II Non-Friable	Damaged	12,000 SF
Plaster	1st Floor – Throughout	Category II Non-Friable	Damaged	5,500 SF
Yellow Base Cove Adhesive	1st Floor – Throughout	Category I Non-Friable	Damaged	70 SF
12" White VFT (Speckled)	1st Floor – Restroom	Category I Non-Friable	Damaged	50 SF
Yellow Mastic	1st Floor – Restroom	Category I Non-Friable	Damaged	50 SF
Gray Exterior Stucco (Old)	Exterior Walls	Category II Non-Friable	Good	6,000 SF
Gray Exterior Stucco (New)	Exterior Walls-Warehouse	Category II Non-Friable	Good	12,000 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	15 Windows

At the time of Inspection this building was undergoing major renovation. Many of the materials identified may be removed as part of the planned renovation. This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas, hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

No access was provided to the back warehouse area with alarmed doors at the time of inspection.

3.15.2 Building 15 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
362,364, 366,368, 370,372, 381,385, 389	Black mastic below green VFT & pink VFT	Back Warehouse	Non-Friable	Good	2-5% Chrysotile
428,432, 436	VFT below white 12" non asbestos VFT	Restroom near stairs	Non-Friable	Good	3% Chrysotile

3.15.3 Building 15 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Black mastic below green VFT & pink VFT	Category I Non-Friable	2,500 SF
VFT below white 12" non asbestos VFT	Category I Non-Friable	50 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.16 Building 18

3.16.1 Building 18 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Gold VFC	Kitchen	Category II Non-Friable	Good	200 SF
Float Material	Kitchen	Category II Non-Friable	Good	200 SF
Black Mastic	Kitchen	Category I Non-Friable	Good	200 SF
Plaster	Throughout	Category II Non-Friable	Damaged	15,000 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	12,000 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	15 Windows
Cloth Wrap/TSI	Basement-Crawl Space	Friable	Good	150 LF
Cement Sink	Basement	Category II Non-Friable	Good	40 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.16.2 Building 18 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos

335, 338, 341	Gold VFC	Kitchen	Non-Friable	Good	20% Chrysotile

(Continued-Building 18 Asbestos-Containing Materials)

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
336, 339, 342	Float Material	Kitchen	Non-Friable	Good	3% Chrysotile
337, 340, 343	Black Mastic	Kitchen	Non-Friable	Good	4-5% Chrysotile

3.16.3 Building 18 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Gold VFC	Category II Non Friable	200 SF
Float Material	Category I Non Friable	200 SF
Black Mastic	Category I Non Friable	200 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.17 Building 32

3.17.1 Building 32 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
12" White VFT (Streak)	Open Area	Category I Non-Friable	Good	240 SF
Yellow / Black Mastic	Open Area	Category I Non-Friable	Good	240 SF
Plaster	Throughout	Category II Non-Friable	Good	18,000 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	600 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	8 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.17.2 Building 32 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.18 Building 33

3.18.1 Building 33 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
12" White VFT (Gray Streaks)	Throughout	Category I Non-Friable	Good	1,000 SF
Yellow Adhesive	Throughout	Category I Non-Friable	Good	1,000 SF
Drywall/Joint Compound	Office / Restroom	Category II Non-Friable	Good	1,100 SF
Wall Coating	Interior Perimeter Wall	Category II Non-Friable	Good	2,100 SF
Yellow Base Cove Adhesive	Office / Restroom	Category I Non-Friable	Good	80 SF
2'x4' White Ceiling Tile	Office / Restroom	Friable	Good	160 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	2,000 SF
Exterior Window Putty	Windows	Category II Non-Friable	Good	8 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.18.2 Building 33 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.19 Building 39

3.19.1 Building 39 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
2'x4' White Ceiling Tile	Office / Restroom	Friable	Good	1,200 SF
HVAC Joint Seal	Ceiling Plenum	Category I Non-Friable	Good	Not Quantified
1'x1' Ceiling Tile	Lobby /Entrances	Friable	Good	1,000 SF
Drywall/Joint Compound	Throughout	Category II Non-Friable	Good	25,000 SF
Cream Base Cove Adhesive	Various Locations	Category I Non-Friable	Good	90 SF
12" mauve VFT	Hallways & Projection Room	Category I Non-Friable	Good	1,500 SF
12" Peach VFT	Hallways & Projection Room	Category I Non-Friable	Good	400 SF
12" Gray VFT	Copy Room	Category I Non-Friable	Good	90 SF
Yellow VFT Adhesive	Throughout	Category I Non-Friable	Good	1,990 SF
Yellow Carpet Adhesive	Various Locations	Category I Non-Friable	Good	2,500 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	10,000 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.19.2 Building 39 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos

1232-34	HVAC Joint Seal	Ceiling Plenum	Non-Friable	Good	20% Chrysotile

(Continued-Building 39 Asbestos-Containing Materials)

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
1249, 1251, 1253	12" Gray VFT	Room 120	Non-Friable	Good	4% Chrysotile
1257	Yellow Carpet Adhesive	Throughout	Non-Friable	Good	5% Chrysotile

3.19.3 Building 39 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
HVAC Joint Seal	Category I Non Friable	1,000 SF
12" Gray VFT	Category I Non Friable	90 SF
Yellow Carpet Adhesive	Category I Non Friable	2,500 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.20 Building 57

3.20.1 Building 57 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
2'x4' White Ceiling Tile	1st Floor - Throughout	Friable	Good	400 SF
Yellow Base Cove Adhesive	1st Floor - Throughout	Category I Non-Friable	Good	50 SF
Yellow Carpet Glue	1st Floor - Throughout	Category I Non-Friable	Good	400 SF
Drywall/Joint Compound	Throughout	Category II Non-Friable	Good	1,400 SF
Plaster	1st Floor @ Column	Category II Non-Friable	Good	50 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	3,000 SF
TSI	2nd Floor Storage Room	Friable	Good	6 Elbows
Yellow Carpet Glue	2nd Floor Storage Room	Category I Non-Friable	Good	160 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.20.2 Building 57 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
110, 111	Yellow/Black Carpet Glue	1st Floor	Non-Friable	Good	3-6 % Crysotile
118	TSI	Storage Room	Friable	Good	11 % Crysotile

3.20.3 Building 57 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Yellow/Black Carpet Glue	Category I Non-Friable	400 SF
TSI	Friable	6 Elbows

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No

mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.21 Building 58

3.21.1 Building 58 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	800 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.21.2 Building 58 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.22 Building 60

3.22.1 Building 60 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Plaster	Interior Walls	Category II Non-Friable	Good	250 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	1,500 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.22.2 Building 60 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes.

All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.23 Building 61

3.23.1 Building 61 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	1,500 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.23.2 Building 61 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.24 Building 62

3.24.1 Building 62 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	**Material Location**	**EPA Category**	**Condition**	**Quantity**
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	1,500 SF

(Continued-Building 32 Suspect Asbestos-Containing Materials)

Material Description	Material Location	EPA Category	Condition	Quantity
Exterior Window Putty	Windows	Category II Non-Friable	Damaged	6 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.245.2 Building 62 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.25 Building 63

3.25.1 Building 63 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Black Adhesive	Ceiling & Walls	Category I Non-Friable	Good	650 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	1,500 SF
Exterior Window Putty	Windows	Category II Non-Friable	Damaged	6 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.25.2 Building 63 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
79-81	Black Adhesive	Ceiling / Walls	Non-Friable	Good	8% Chrysotile

3.25.3 Building 63 – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Black Adhesive	Category I Non-Friable	650 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.26 Building 65

3.26.1 Building 65 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Drywall/Joint Compound	Interior Perimeter Wall	Category II Non-Friable	Good	600 SF
Gasket	Pipe	Category II Non-Friable	Good	Not Quantified
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	2,000 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.26.2 Building 65 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.27 Building T35

3.27.1 Building T35 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
2'x4' White Ceiling Tile	Restroom	Friable	Good	30 SF
Yellow Base Cove Adhesive	Restroom	Category I Non-Friable	Good	10 SF
Wall Texture	Restroom	Category II Non-Friable	Good	430 SF
Joint Compound	Restroom	Category II Non-Friable	Good	200 SF
Drywall/Joint Compound	Throughout	Category II Non-Friable	Good	430 SF
Plaster	Ceiling Rafters	Category II Non-Friable	Good	60 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	600 SF
Exterior Window Putty	Exterior Windows	Category II Non-Friable	Damaged	Not Quantified

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.27.2 Building T35 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.28 Building T35A

3.28.1 Building T35A - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	600 SF
Exterior Window Putty	Exterior Windows	Category II Non-Friable	Damaged	16 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.28.2 Building T35A - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.29 Building T38A

3.29.1 Building T38A - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Drywall/Joint Compound	Office / Restroom	Category II Non-Friable	Good	1,100 SF
Wall Texture	Restroom	Category II Non-Friable	Good	400 SF
12" White VFT (Speckled)	Office	Category I Non-Friable	Good	100 SF
Clear Adhesive	Office	Category I Non-Friable	Good	100 SF
Yellow Base Cove Adhesive	Office	Category I Non-Friable	Good	25 SF
White Sink Coating	Wash Area	Category I Non-Friable	Good	5 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	800 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.29.2 Building T38A - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.30 Building T38B

3.30.1 Building T38B - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Joint Compound	Throughout Wallboard Connections	Category II Non-Friable	Good	800 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	800 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.30.2 Building T38B - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
195	Joint Compound	Metal Joints	Non-Friable	Good	3% Chrysotile

3.30.3 Building T38B – Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Joint Compound	Category II Non-Friable	800 SF

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by all parties, including any contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of all TSI was not determined due to significant restrictions, which are as follows: (1) piping enclosed inside walls, (2) ceiling panel support/tie wires, (3) firewall extensions between floors throughout the plenums, and (4) the need to avoid creating/releasing dust inside the hospital.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.31 Building T46

3.31.1 Building T46 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Drywall/ Joint Compound	Throughout	Category II Non-Friable	Good	4,800 SF
Gray Exterior Stucco	Exterior Walls	Category II Non-Friable	Good	2,500 SF
Exterior Window Putty	Exterior Windows	Category II Non-Friable	Good	16 Windows

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.31.2 Building T46 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect materials located on the roofs must be assumed to be asbestos containing until such time they have been tested and shown otherwise.

3.32 Building T59

3.32.1 Building T59 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
2'x4' White Ceiling Tile	Throughout	Friable	Good	1,800 SF
White Ceiling Tile	Throughout	Friable	Good	1,800 SF
Drywall/ Joint Compound	Throughout	Category II Non-Friable	Good	5,000 SF
Yellow Carpet Glue	Throughout	Category I Non-Friable	Good	1,800 SF
12" Blue VFT	Women's Restroom	Category I Non-Friable	Good	80 SF
Yellow Adhesive	Women's Restroom (Below VFT)	Category I Non-Friable	Good	80 SF
Yellow Base Cove Adhesive	Throughout	Category I Non-Friable	Good	150 SF
12" Light Blue VFT	Men's Restroom	Category I Non-Friable	Good	50 SF
Clear Adhesive	Men's Restroom (Below VFT)	Category I Non-Friable	Good	50 SF
Wall Texture	Cubicle Area	Category II Non-Friable	Good	2,500 SF

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.32.2 Building T59 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to suspect asbestos-containing roofing materials there may be other suspect ACMs located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect ACMs located on the roofs must be assumed to be asbestos containing until they have been tested and laboratory results prove otherwise.

3.33 Building T61

3.33.1 Building T61 - Suspect Asbestos-Containing Materials

The following table lists the suspect asbestos containing materials identified within the building.

Material Description	Material Location	EPA Category	Condition	Quantity
Yellow Carpet Glue	Throughout	Category I Non-Friable	Good	2,000 SF
Yellow/Cream Base Cove Adhesive	Throughout	Category I Non-Friable	Good	200 SF
2'x4' White Ceiling Tile	Throughout	Friable	Good	2,500 SF
White Ceiling Tile	Throughout	Friable	Good	2,500 SF
Drywall/ Joint Compound	Throughout	Category II Non-Friable	Good	6,000 SF
12" White VFT	Restrooms	Category I Non-Friable	Good	110 SF
Clear Adhesive	Restrooms (Below VFT)	Category I Non-Friable	Good	110 SF
White/Gray Caulking	Women's Restroom Along Wall	Category I Non-Friable	Good	Not Quantified

This inspection was conducted as a comprehensive survey but due to the inaccessibility of some areas hidden materials may exist that would only be accessible through destructive

measures. Such materials would include but are not limited to TSI on pipes in wall cavities, materials above hard lid ceilings, below carpeting, laminate flooring or flooring overlays, and pipe gaskets. None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection.

3.33.2 Building T61 - Samples Reported as Asbestos-Containing

None of the samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory were reported to contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

None of the roofs were accessed or inspected during this survey as directed by NMVAHCS personnel at the time of the inspection. Therefore none of the roofing materials were sampled. In addition to suspect asbestos-containing roofing materials there may be other suspect ACMs located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect ACMs located on the roofs must be assumed to be asbestos containing until they have been tested and laboratory results prove otherwise.

4.0 SUSPECT ACMS – NOT SAMPLED

4.1 Underground Cement (Transite) Utilities Pipe

Although excavation and/or review of as-built underground utility drawings were not part of this investigation, it should be assumed that Transite utility pipes may exist underground. Water delivery and electrical systems often used Transite pipe – an asbestos containing cement material – and should be assumed to be present below surface throughout the site. An investigation should be performed prior to any planned excavating, grading, or digging.

4.2 Roofing Materials

None of the roofs were accessed or inspected during this survey. Therefore none of the roofing materials were sampled. In addition to suspect asbestos-containing roofing materials there may be other suspect ACMs located on the roof such as but not limited to HVAC duct seam, patching & penetration tar and TSI on pipes. All suspect ACMs located on the roofs must be assumed to be asbestos containing until they have been tested and laboratory results prove otherwise.

4.3 Laboratory Counter Tops

Several buildings at this facility have laboratory counter tops that are suspect asbestos-containing materials. Sampling these materials is very destructive and would ruin a portion of the counter top. Destructive testing was not a part of the scope of work for this sampling project. These materials must be assumed to be asbestos-containing until they have been tested and laboratory results prove otherwise.

4.4 Mirror Mastic/Adhesives

Several buildings at this facility have wall mounted mirrors that are applied with adhesive. The adhesive is a suspect asbestos-containing material. Sampling these materials is very destructive and would result in broken mirrors. Destructive testing was not a part of the scope of work for this sampling project. These materials must be assumed to be asbestos-containing until they have been tested and laboratory results prove otherwise.

5.0 GENERAL INFORMATION

5.1 Asbestos Definition

Asbestos is a term used to describe six different naturally occurring mineral fibers found in certain rock formations. Asbestos fibers can be found in relatively low levels nearly everywhere in the environment. Prior to 1980, asbestos mineral fibers were used extensively as matrix components during the manufacturing of building materials and products. Asbestos became a popular building material component due to the strength of the fibers, their resistance to heat and corrosion and their tremendous insulation and acoustic properties. Due to the fibers small size and weight, once airborne (during demolition or after damage), they can remain suspended for many hours. Airborne releases pose a potential exposure condition because the inhalation of airborne asbestos fibers can cause serious health problems. The Environmental Protection Agency (EPA) and the Occupational Health and Safety Administration (OSHA) have enacted several laws to protect the public and private sector from excessive exposure to airborne asbestos fibers. An asbestos survey is the first step in the complicated process of identifying asbestos-containing materials in a building and monitoring the condition, removal and disposal.

5.2 Regulatory Overview

In 1986, Congress enacted the Asbestos Hazard Emergency Response Act (AHERA or TSCA Title II), which mandated a regulatory program to address asbestos hazards in schools. In 1990, Congress enacted Asbestos School Hazard Abatement Reauthorization Act (ASHARA) that amended AHERA to extend some of the training, accreditation requirements, and sampling protocol to persons performing asbestos-related work in public and commercial building. The key elements to AHERA/ASHARA regulations require the development of an Operations and Maintenance (O&M) program if friable ACM (or non-friable ACM which will become friable) is present in a building.

5.3 Asbestos Sampling

The sampling protocol established within AHERA (extended to commercial buildings by ASHARA) was used to determine the required number of samples for this survey based on the type, number and location of homogeneous building materials. AHERA protocol was used to determine homogeneous areas of construction in the building. Three forms of asbestos are typically found in buildings: (1) sprayed- or toweled-on surfacing materials, (2) insulation on pipes, boilers and other mechanical equipment, and (3) miscellaneous forms such as floor tile, ceiling tile, roofing materials, wallboards, window glazing, etc. AHERA recommends the collection of a minimum of nine (9) samples for each suspect asbestos-containing material

(ACM). However, the minimum numbers of samples required by AHERA for sampling purposes are listed in the following table:

ALTEC SAMPLING PROTOCOL

Type of Material	Estimated Quantity	Required Samples
Sprayed or Troweled-on Surfacing Material	Greater than 5,000 SF	7
Sprayed or Troweled-on Surfacing Material	Between 1,000 and 5,000 SF	5
Sprayed or Troweled-on Surfacing Material	Less than 1,000 SF	3
Thermal System Insulation	All Quantities	3
Miscellaneous Materials	All Quantities	3

All suspect materials that were observed in the assessment area covered by the scope of work were assessed. Materials may exist in the buildings that were inaccessible at the time of the property inspection and survey. If through demolition or renovation, additional suspect materials are discovered or additional quantities of identified ACM are encountered, further testing may be required to determine the asbestos content prior to any further renovation or demolition activities.

The suspect asbestos-containing materials included in this survey were collected by the most unobtrusive means possible. When deemed necessary and approved by the Client, destructive sampling methods were employed to collect samples or to confirm location of materials beneath or behind other materials. When practical, buildings are typically surveyed in teams of two inspectors with one person documenting the proceedings of the survey, the other performing bulk sampling and other miscellaneous activities. One individual who then performs all of the survey and sampling tasks often surveys small facilities. The teams or individuals perform a preliminary visual inspection of the property to identify and quantify suspect ACM. A sampling strategy is then developed to provide representative sampling. Efforts are made to obtain samples from inconspicuous areas thus limiting the damage to surfaces and materials while still providing ample materials for analysis. Bulk samples were removed with a sharp blade that was cleaned between samples. A water mister with amended water was used to wet samples and sample areas. Appropriate health and safety procedures were utilized. Each sample is placed in a plastic bag collection container; the container is sealed, labeled and placed in a larger storage bag. Destructive inspection methods to find concealed asbestos are used only in those areas specified for renovation or demolition, and only to the extent approved by the client. Care is taken to prevent cross-contamination of the collected samples and sampling equipment is cleaned after each sample is obtained. In addition, sample containers are placed directly beneath each sample location, when feasible, to collect any materials which may become dislodged during the sampling process. Any debris

generated by the sampling is cleaned by wet-cleaning methods or by vacuuming utilizing a High Efficiency Particulate Air (HEPA) filter. Visible emissions to the outside were not permitted during the sampling, packaging, transportation, or disposal of the samples. Samples are documented by entering the sample data on hazard assessment sheets. The field number that is assigned to the collection bag at the time of sampling consists of the Altec Client Project (CP) number and the sample number or the Task number and sample number. The recorded information includes a description of the material, sample number, location, condition, accessibility, friability, damage potential, and quantity of homogeneous materials that that sample represents.

5.4 Asbestos Analysis

LA Testing located at 10772 Noel Street Los Alamitos CA, analyzed the asbestos bulk samples that were collected at this site. LA Testing is fully accredited in the analysis of asbestos samples by Polarized Light Microscopy (PLM) using Environmental Protection Agency (EPA) Method 600/R-93/116. This accreditation is provided by the United States Department of Commerce, National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP).

Bulk samples were initially examined under stereoscopic microscopes at a magnification of 8X to 50X. Stereoscopic observations of each sample were made and the results were recorded. Portions of each sample were immersed in a fluid with a known refractive index. The sample was examined under polarized light using microscopes with a McCrone Dispersion Staining Objective. Optical characteristics of the fibrous material were examined to determine the mineralogy of the fiber. The observed optical characteristics include angle of extinction, sign of elongation and dispersion staining colors. Asbestos fiber content is estimated by optically comparing the quantity of non-asbestos material to asbestos fibers. The lower limit of reliable detection using PLM is 1%. Samples that contain more than 1-% asbestos are reported in percent ranges. Samples that contain asbestos in a concentration lower than the limit of reliable detection (<1%) are reported as "trace" or "<1". Samples in which no asbestos is observed are reported as "None Detected". Samples that are reported to contain between one and ten (1-10%) asbestos are typically recommended for an alternative PLM analytical method referred to as "point counting" method. Samples that contain between one and ten percent (1-10%) asbestos are not automatically re-analyzed by the point-count method unless specifically approved by the client. Altec will contact the client as soon as results are available to recommend and discuss Point Counting re-analysis. Any additional methods of analysis will be conducted with an additional cost to the client.

5.5 Asbestos Hazard Assessment

Hazard assessment sheets were filled out for each sample collected. The hazard assessment is assessed on the following criteria:

A. Condition	D. Friability
B. Accessibility	E. Exposed Surface Area of Material
C. Activity	F. Percent of Asbestos

The hazard assessment has a rating from -1 to 22. Any samples with negative numbers associated with them are considered "asbestos free". Any samples with positive numbers associated with them are positive for asbestos. Negative one (-1) is indicative of the least hazardous or "ASBESTOS FREE" condition. Twenty-two is indicative of the most hazardous condition. The hazard rating formula was designed by Altec to conform to the AHERA that regulates schools. All data contained in the hazard assessment sheets has been entered into our computer database for future reference.

Proper utilization of the survey data will ensure cost effectiveness and safe working conditions for employees and contractors.

Currently, there are no laws mandating the removal of ACM from private industry facilities. Management must, however, ensure control of ACM to comply with regulations and standards for worker safety.

5.6 Limitations of Inspection

The work that was performed during this investigation was done at the request of the client or the client's representative. The investigation was done so in a non-destructive manner. No repairs of the materials sampled were undertaken in the execution of this survey.

Materials may exist in inaccessible or hidden areas of the facility that were not observed or inspected during this investigation. This inspection was conducted as a complete facility survey or inspection but due to the inaccessibility of some areas and cavities in the buildings hidden materials may exist, that will only be accessible through demolition. Hidden materials may include, but are not limited to: Thermal systems insulation (TSI) covered with metal jacketing, gasket material at pipe connections between flanges, vent pipe or duct insulation within wall cavities, vinyl floor tile or sheet flooring beneath sub-floors or overlays, spray-on acoustic texture hidden by door jams or covered with drywall.

The quantification of the asbestos-containing materials are estimates made at the time of sampling. The quantities are estimates only and should be verified by the contractors bidding the project to determine exact square footage's and the accessibility of the specific materials.

The opinions and conclusions presented here are based on field investigation, and observations made in the field, and are consistent with practices and actions of consulting professionals in the asbestos and industrial hygiene field.

5.7 Asbestos Removal

Any asbestos-containing materials that are present in or on the structures and will be impacted by any planned renovation/demolition activities must be properly removed or controlled by a registered and licensed asbestos contractor before any renovation/demolition work begins.

Licensed asbestos abatement contractors with the proper bonding and experience in similar asbestos projects must perform all work involving the removal of asbestos-containing materials.

A variety of federal, state and local regulations govern the way building owners must deal with ACM in their facilities. State and local regulations may be more stringent than federal standards and often change rapidly. The management and removal of asbestos in schools, commercial and public buildings is regulated by many different agencies under several different laws. The following is a listing of laws pertaining to asbestos sampling, assessment, management, removal, transportation and disposal.

- OSHA Construction Industry Standard for Asbestos (29 CFR 1926.1101)
- OSHA General Industry Asbestos Standard (29 CFR 1910.1001)
- OSHA Respiratory Protection Standard (29 CFR1910.134)
- Cal/OSHA Title 8 Section 1529 Asbestos Standards
- EPA's Worker Protection Rule (40 CFR 763 Subpart G)
- EPA National Emission Standard for Hazardous Air Pollutants (NESHAP) (40 CFR 61 Subpart M)
- EPA Asbestos Hazard Emergency Response Act (AHERA) Regulations (40 CFR 763 Subpart E)
- EPA Asbestos Ban and Phase out Rule (40 CFR 763 Subpart I)
- Applicable New Mexico Environment Department Air Quality Bureau (AQB) Regulations
- Applicable New Mexico Occupational Health and Safety Bureau (OHSB) of the Environment Department Regulations
- Applicable New Mexico Construction Industries Division Regulations

Compliance with regulatory agencies must be maintained in order to avoid legal liability from exposure to workers and the environment.

ASBESTOS SURVEY REPORT

Prepared for:
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number: GS-10F-0328R
Order Number: VA258-Q-0471

Included Buildings:
10, 10A, 41, 42, 43, 43A, 45, 46, 49, 49A, 50, 51, 52, 53, 54, 55, 56, 64, 66, 67, 67A, 94, T3, T15C, T15D, T51, T60, T71, T72, T73 and T74

MEC^X Project Number: 1244.019C.00

Prepared by:
MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

Matthew Haak
TDSHS MAC # 0218

18 February 2016

TABLE OF CONTENTS

Section *Page*

1.0 INTRODUCTION 1

2.0 SCOPE OF WORK 3

2.1 METHODOLOGY 3

2.2 SURVEY DESCRIPTION 4

3.0 FINDINGS PER BUILDING 5

3.1 BUILDING 41 5

3.1.1 Building 41 - Suspect Asbestos-Containing Materials 5
3.1.2 Building 41 - Samples Reported as Asbestos-Containing 6
3.1.3 Building 41 - Asbestos-Containing Materials Inventory Summary 8
3.1.3.1 Quad A Mechanical Rooms 8
3.1.3.2 Quad B Mechanical Rooms 8
3.1.3.3 Quad C Mechanical Rooms 9
3.1.3.4 Quad D Mechanical Rooms 9
3.1.3.5 Building 41 - Interstitial Spaces 10
3.1.4 Building 41 - Inspection Notes 10
3.1.5 Building 41 - Conclusions 10

3.2 BUILDING 10 12

3.2.1 Building 10 - Suspect Asbestos-Containing Materials 12
3.2.2 Building 10 - Samples Reported as Asbestos-Containing 12
3.2.3 Building 10 - Asbestos-Containing Materials Inventory Summary 13
3.2.4 Building 10 - Inspection Notes 13
3.2.5 Building 10 - Conclusions 13

3.3 BUILDING 10A 15

3.3.1 Building 10A - Suspect Asbestos-Containing Materials 15

3.4 BUILDING 42 16

3.4.1 Building 42 - Suspect Asbestos-Containing Materials 16
3.4.2 Building 42 - Samples Reported as Asbestos-Containing 16
3.4.3 Building 42 - Asbestos-Containing Materials Inventory Summary 16
3.4.4 Building 42 - Conclusions 16

3.5 BUILDING 43 18

3.5.1 Building 43 - Suspect Asbestos-Containing Materials 18
3.5.2 Building 43 - Samples Reported as Asbestos-Containing 18
3.5.3 Building 43 - Asbestos-Containing Materials Inventory Summary 20
3.5.4 Building 43 - Conclusions 20

3.6 BUILDING 43A 22

3.6.1 Building 43A - Suspect Asbestos-Containing Materials 22
3.6.2 Building 43A - Samples Reported as Asbestos-Containing 22

TABLE OF CONTENTS (CONTINUED)

Section *Page*

3.6.3 Building 43A - Asbestos-Containing Materials Inventory Summary 22

3.7 BUILDING 45 23
3.7.1 Building 45 - Suspect Asbestos-Containing Materials 23
3.7.2 Building 45 - Samples Reported as Asbestos-Containing 23
3.7.3 Building 45 - Asbestos-Containing Materials Inventory Summary 23

3.8 BUILDING 46 24
3.8.1 Building 46 - Suspect Asbestos-Containing Materials 24
3.8.2 Building 46 - Samples Reported as Asbestos-Containing 24
3.8.3 Building 46 - Asbestos-Containing Materials Inventory Summary 24
3.8.4 Building 46 - Conclusions 25

3.9 BUILDING 49 & 49A 26
3.9.1 Buildings 49 & 49A - Suspect Asbestos-Containing Materials 26
3.9.2 Buildings 49 & 49A - Samples Reported as Asbestos-Containing 26
3.9.3 Buildings 49 & 49A - Asbestos-Containing Materials Inventory Summary 26

3.10 BUILDING 50 27
3.10.1 Building 50 - Suspect Asbestos-Containing Materials 27
3.10.2 Building 50 - Samples Reported as Asbestos-Containing 27
3.10.3 Building 50 - Asbestos-Containing Materials Inventory Summary 27

3.11 BUILDING 51 28
3.11.1 Building 51 - Suspect Asbestos-Containing Materials 28

3.12 BUILDING 52 29
3.12.1 Building 52 - Suspect Asbestos-Containing Materials 29
3.12.2 Building 52 - Samples Reported as Asbestos-Containing 29
3.12.3 Building 52 - Asbestos-Containing Materials Inventory Summary 29

3.13 BUILDING 53 30
3.13.1 Building 53 - Suspect Asbestos-Containing Materials 30
3.13.2 Building 53 - Samples Reported as Asbestos-Containing 30
3.13.3 Building 53 - Asbestos-Containing Materials Inventory Summary 30

3.14 BUILDING 54 31
3.14.1 Building 54 - Suspect Asbestos-Containing Materials 31
3.14.2 Building 54 - Samples Reported as Asbestos-Containing 31
3.14.3 Building 54 - Asbestos-Containing Materials Inventory Summary 31

3.15 BUILDING 55 32
3.15.1 Building 55 - Suspect Asbestos-Containing Materials 32
3.15.2 Building 55 - Samples Reported as Asbestos-Containing 32
3.15.3 Building 55 - Asbestos-Containing Materials Inventory Summary 32

TABLE OF CONTENTS (CONTINUED)

Section *Page*

3.16 BUILDING 56 33
3.16.1 Building 56 - Suspect Asbestos-Containing Materials 33
3.16.2 Building 56 - Samples Reported as Asbestos-Containing 33
3.16.3 Building 56 - Asbestos-Containing Materials Inventory Summary 33

3.17 BUILDING 66 34
3.17.1 Building 66 - Suspect Asbestos-Containing Materials 34
3.17.2 Building 66 - Samples Reported as Asbestos-Containing 34
3.17.3 Building 66 - Asbestos-Containing Materials Inventory Summary 34

3.18 BUILDING 67 35
3.18.1 Building 67 - Suspect Asbestos-Containing Materials 35
3.18.2 Building 67 - Samples Reported as Asbestos-Containing 35
3.18.3 Building 67 - Asbestos-Containing Materials Inventory Summary 35

3.19 BUILDING 67A 36
3.19.1 Building 67A - Suspect Asbestos-Containing Materials 36
3.19.2 Building 67A - Samples Reported as Asbestos-Containing 36
3.19.3 Building 67A - Asbestos-Containing Materials Inventory Summary 36

3.20 BUILDING 94 37
3.20.1 Building 94 - Suspect Asbestos-Containing Materials 37

3.21 BUILDING T74 38
3.21.1 Building T74 - Suspect Asbestos-Containing Materials 38
3.21.2 Building T74 - Samples Reported as Asbestos-Containing 38
3.21.3 Building T74 - Asbestos-Containing Materials Inventory Summary 38

3.22 BUILDING T15C 39
3.22.1 Building T15C - Suspect Asbestos-Containing Materials 39
3.22.2 Building T15C - Samples Reported as Asbestos-Containing 39
3.22.3 Building T15C - Asbestos-Containing Materials Inventory Summary 39
3.22.3 Building T15C - Conclusions 39

3.23 BUILDING T15D 40
3.23.1 Building T15D - Suspect Asbestos-Containing Materials 40
3.23.2 Building T15D - Samples Reported as Asbestos-Containing 40
3.23.3 Building T15D - Asbestos-Containing Materials Inventory Summary 40

3.24 BUILDING T60 41
3.24.1 Building T60 - Suspect Asbestos-Containing Materials 41
3.24.2 Building T60 - Samples Reported as Asbestos-Containing 41
3.24.3 Building T60 - Asbestos-Containing Materials Inventory Summary 41

3.25 BUILDING T72 42

TABLE OF CONTENTS (CONTINUED)

Section ***Page***

3.25.1 Building T72 - Suspect Asbestos-Containing Materials 42
3.25.2 Building T72 - Samples Reported as Asbestos-Containing 42
3.25.3 Building T72 - Asbestos-Containing Materials Inventory Summary 42

3.26 BUILDING T3 43
3.26.1 Building T3 - Suspect Asbestos-Containing Materials 43

3.27 BUILDING T51 44
3.27.1 Building T51 - Suspect Asbestos-Containing Materials 44

3.28 BUILDING T71 45
3.28.1 Building T71 - Suspect Asbestos-Containing Materials 45

3.29 BUILDING T73 46
3.29.1 Building T73 - Suspect Asbestos-Containing Materials 46

4.0 CONCLUSIONS AND RECOMMENDATIONS 47

5.0 LIMITATIONS 48

6.0 ASBESTOS SURVEY SAMPLING STRATEGY 49

APPENDICES

A – Asbestos Summary Table
B – Laboratory Results
C – MEC^{x}'s Project Team Certifications
D – Photo Log
E - Figures

ACRONYMS

Acronym ***Page first used***

A

Air Handler Unit (AHU) 9
Asbestos- Containing Building Materials (ACBM) 3
asbestos-containing material (RACM) 3
asbestos-containing materials (ACMs) 1

E

Environmental Protection Agency (U.S. EPA) 3
EPA Asbestos Model Accreditation Plan (MAP) 1

F

feet (ft; ‘) 6

H

heating, ventilating, and air conditioning (HVAC) 2
homogeneous areas (HA) 6

I

inch (") 6

L

linear (lin. 9
Loflin Environmental Services, Inc. (Loflin) 3

N

National Emissions Standards for Hazardous Air Pollutants (NESHAP) 1
National Institute of Standards and Technology (NIST) 3
National Voluntary Laboratory Accreditation Program (NVLAP) 3
New Mexico Air Quality Bureau (CABQ) 1
New Mexico Occupational Health and Safety Bureau (OHSB) 1

O

Occupational Safety and Health Administration (OSHA) 1

P

polarized light microscopy (PLM) 3

ACRONYMS

Acronym ***Page first used***

R

Raymond G. Murphy New Mexico Veterans Affairs Health Care System (NMVAHCS) 1

S

Square Feet (sf) 1

T

Texas Department of State Health Services (TDSHS) 1
the EPA Asbestos Hazard Emergency Response Act (AHERA) 1
thermal system insulation (TSI) 2

U

United States (U.S.) 3

1.0 INTRODUCTION

This report provides the results of a survey for asbestos-containing materials (ACMs) completed for thirty-one (31) buildings within the Raymond G. Murphy New Mexico Veterans Affairs Health Care System (NMVAHCS) located at 1501 San Pedro SE in Albuquerque, New Mexico (Site).

MEC^X conducted the survey in order to meet requirements that are compliant with the EPA Asbestos Hazard Emergency Response Act (AHERA) regulations (40 CFR 763), National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR 61, Subpart M), The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763, *the Occupational Safety and Health Administration (OSHA) Asbestos Standards (29 CFR 1910.1001 and 29 CFR 1926.1101) and the local New Mexico Environment Department Air Quality Bureau (CABQ) and the New Mexico Occupational Health and Safety* Bureau (OHSB) rules, regulations and guidelines for renovation/demolition

MEC^X representatives Mr. Matthew Haak (TDSHS License 10-5791) and Mr. James Murray (TDSHS License 10-5776), are Texas Department of State Health Services (TDSHS) licensed Asbestos Consultants.

TDSHS licensing and training meet the EPA Asbestos Model Accreditation Plan (MAP) requirements. Training for asbestos professionals is required under the EPA Asbestos MAP which EPA issued under the Asbestos Hazard Emergency Response Act of 1986 (AHERA). The MAP requires the use of trained and accredited asbestos professionals when conducting asbestos inspections or designing or conducting response actions at schools and public and commercial buildings. It provides guidance to states on the minimum training requirements for accrediting asbestos professionals. State training programs must be at least as stringent as the MAP. The MAP established five required training disciplines:

- Worker;
- Contractor/supervisor;
- Inspector;
- Management planner; and
- Project designer

As licensed Asbestos Consultants, MEC^X's representatives are accredited to perform the functions of the five disciplines.

MEC^X completed the survey on August 16-20, 2105 and October 5-7, 2015.

The following buildings, as specified by representatives of the NMVAHCS, were included in this survey:

Building No.	Building Use	Year Built	Number of Floors	Approximate Square Feet (sf)
10	Research- Administration	2014	3	10,000
10A	Electric Room	2014	1	336
41	Clinical-Administrative-Hospital-Interstitial	1986	13	577,353
42	Electrical Vault and Emergency Generator Room	1986	1	2,884
43	Energy Plant	2006	3	14,280
43A	Energy PlantPump House	2012	1	486
45	Spinal Cord Injury	1991	1	53,721

Building No.	Building Use	Year Built	Number of Floors	Approximate Square Feet (sf)
46	Warehouse	1986	1	21,688
49	MRI	1990	2	7,500
49A	MRI	1993	2	2,218
50	GU Clinic	1992	1	3,290
51	Warehouse	1982	1	1,200
52	Mental Health Administration	2012	1	7,343
53	Behavioral Health Care	2013	2	17,607
54	Hospital - Patient Overnight Housing	2010	1	3,626
55	Hospital – Patient Overnight Housing	2008	1	3,496
56	Projects and ContractsOffice	2008	1	8,848
64	Well House	1996	1	576
66	Research- Administration	2011	1	4,620
67	Research- Administration	2011	1	4,180
67A	Research-Electrical	2012	1	400
94	Pump House	2013	1	190
T3	Warehouse	1984	1	5000
T15C	Employee Fitness-Police	1980	1	2320
T73	Linen StorageWarehouse	2011	1	1,650
T74	Research StorageWarehouse	2011	1	1,500

As directed by NMVAHCS personnel at the time of the inspection, MEC^X did not access or inspect the building roofs during this survey. Therefore, MEC^X did not collect samples of the roofing materials. In addition, there may be suspect asbestos-containing materials located on the roof such as but not limited to heating, ventilating, and air conditioning (HVAC), duct seam, patching and penetration tar and thermal system insulation (TSI) on pipes. Suspect materials located on the roofs must be assumed to be asbestos-containing until such time they have been tested and shown otherwise.

2.0 SCOPE OF WORK

The objective of this survey, as defined by the client, was to collect representative samples of suspect friable and non-friable ACMs located in the interior building spaces and exterior suspect Asbestos- Containing Building Materials (ACBM), excluding Roofs and Roofing Material. In addition to collection ACM samples, the assessment of the condition of the suspect materials and quantified materials containing asbestos was to be noted. The assessment, sampling and subsequent analysis was conducted in order to identify ACMs within the NMVAHCS facility.

In addition to the collection and analysis of bulk samples, MEC^X will review, update and incorporate new findings into the existing NMVAHCS Asbestos Management and Operations Plan.

2.1 METHODOLOGY

The survey consisted of inspections of reasonably accessible building components to identify suspect ACM. MEC^X's representatives, TDSHS licensed Asbestos Inspector/Consultant, collected samples of suspect ACM in accordance with the EPA Model Accreditation Plan specified in the AHERA.

The collected samples were placed in polyethylene bags, given unique sample numbers and transported for analysis (following chain-of-custody protocol) to Loflin Environmental Services, Inc. (Loflin), in Houston, Texas, which is a TDSHS licensed asbestos laboratory. Loflin is a participating member in the National Institute of Standards and Technology (NIST) administered by the National Voluntary Laboratory Accreditation Program (NVLAP). Bulk samples submitted for testing were analyzed for asbestos content by polarized light microscopy (PLM).

The laboratory analyzed the bulk samples using PLM, according to protocol of the United States (U.S.) Environmental Protection Agency (U.S. EPA) Analytical Method EPA/600/R-93/116. The USEPA defines an ACM as material that contains greater than one (1) percent asbestos by PLM analysis (NESHAP 40 CFR Part 61, Subpart M). When the bulk samples contained more than one layer, the laboratory analyzed layers of the sample.

Suspect samples containing less than or equal to one percent asbestos are not to be considered ACM by regulatory definition. If lab analysis found the material samples were asbestos-containing, then the material has to potential to be considered a regulated asbestos-containing material (RACM), according the EPA's NESHAP regulation for renovations and demolitions (reference 40 CFR Part 61).

Suspect ACMs were classified as either friable or non-friable during the inspection. ACMs also were classified as either friable or non-friable.

- Friable ACMs are those that contain more than one percent asbestos and, when dry, can be crumbled, pulverized or reduced to powder by hand pressure. Friable ACMs are considered RACM and, therefore, subject to EPA regulations.
- Non-friable ACMs cannot be crushed with hand pressure. Non-friable ACMs are categorized as either Category I or Category II materials.
    - Category I - non-friable asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products.
    - Category II - non-friable ACMs, excluding Category I non-friable ACMs.

2.2 SURVEY DESCRIPTION

MEC^X collected approximately 710 representative bulk samples of accessible interior suspect asbestos-containing materials. Suspect ACMs may exist in inaccessible and/or hidden areas of the structures that were not observed or inspected during this investigation. This inspection was a comprehensive survey, but due to the inaccessibility of some areas, hidden materials may exist that would only be accessible through destructive measures (which was outside the scope of this survey).

MEC^X conducted a limited survey of the building exteriors. As directed by NMVAHCS personnel, MEC^X did not access or inspect the roofs during this survey. Therefore, MEC^X did not collect samples of roofing materials. In addition to the roofing materials there may be suspect materials located on the roof such as but not limited to HVAC duct seam, patching and penetration tar and TSI on pipes. Suspect materials located on the roofs must be assumed to be asbestos-containing until such time they have been tested and shown otherwise.

The quantification of the asbestos-containing materials is an estimate made at the time of sampling. The quantities are estimates only and should be verified by parties, including contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials.

3.0 FINDINGS PER BUILDING

3.1 BUILDING 41

3.1.1 Building 41 - Suspect Asbestos-Containing Materials

The following table lists the homogeneous areas (HA) of suspect asbestos-containing materials identified and sampled within Building 41.

HA Materials		
1. 2 feet (ft; ‘) x2' White Recessed Grid, No Cuts	2. Gray Duct Mastic On Metal Ducts	3. 12 inch (") x12" Pink & Blue Floor Tile & Yellow Mastic
4. Sheet Vinyl Flooring, New, Blue, Tan & Faux Wood	5. 12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	6. 12"x12" Sand White Floor Tile & Yellow Mastic
7. White Joint Compound	8. 12"x12" Floor Tile, Black Smudges & Yellow Mastic	9. Gray Pebbly
10. Heating Water Insulation Mastic	11. Faux Wood Sheet Vinyl, Narrow Strips	12. Tan Mottled Sheet Vinyl
13. 12"x12" Olive Floor Tile & Yellow Mastic	14. 2'X4' White Ceiling Tile, Small Cuts & Dots, New	15. 12"x12" Taupe Floor Tile & Yellow Mastic
16. Yellow Carpet Mastic	17. 2'X4' White Ceiling Tile, Cuts & Dots, Old	18. White Duct Insulation Mastic On Air Handler Unit
19. 12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	20. Steam Mastic	21. Tan Exterior Stucco & Plaster
22. Chilled Water Supply Insulation Mastic	23. Red Fire Stop	24. 2'x4' Smooth Ceiling Tile
25. Hot Water Return Insulation Mastic	26. Gray Fire Stop Plaster	27. 12"x12" Cranberry Mottled Floor Tile & Yellow Mastic
28. 12"x12" Taupe Floor Tile, Heavy Mottled & Yellow Mastic	29. Chilled Water Return Insulation Mastic	30. 12"x12" Peach Floor Tile & Yellow Mastic
31. 12"x12" Beige Floor Tile With Mottling & Yellow Mastic	32. Hot Water Supply Insulation Mastic	33. Stair Tread Black Mastic
34. Tan Sheet Vinyl	35. Red Metal Duct Mastic On Metal Duct Seams	36. 2'x2' White Ceiling Tile Dots
37. Spray Applied Fire Proofing	38. Faux Wood Sheet Vinyl, Wider Strips	39. 12"x12" White Floor Tile With Gray Spots
40. Troweled Applied Fire Proofing	41. 12"x12" Green Floor Tile & Yellow Mastic	42. 2'x4' Ceiling Tile Squiggle Cuts
43. Domestic Water Insulation Mastic At Hangar At Wall	44. Metal Duct Seam Mastic	45. 4" Yellow Cove Base Mastic
46. Roof Drain Insulation Mastic	47. Sewer Drain Insulation Mastic	48. Domestic Hot Water Pipe Insulation Mastic
49. Gray Sheet Vinyl Textured	50. 2’x2’ Recessed Grid	51. AHU Insulation Mastic

HA Materials		
52. Chilled Water Supply Insulation Mastic	53. White Hot Water Supply Insulation Mastic	54. White Duct Insulation Mastic

3.1.2 Building 41 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B41-CHWS-01	Chilled Water Supply Insulation Mastic	Building 41, 6th Floor Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWS-02	Chilled Water Supply Insulation Mastic	Building 41, 4th Floor Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWS-03	Chilled Water Supply Insulation Mastic	Building 41, Basement Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWR-01	Chilled Water Return Insulation Mastic	Building 41, 6th Floor Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWR-02	Chilled Water Return Insulation Mastic	Building 41, 4th Floor Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWR-03	Chilled Water Return Insulation Mastic	Building 41, Basement Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-CHWX-01	Chilled Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-CHWX-02	Chilled Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-CHWX-03	Chilled Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-HWS-01	Hot Water Supply Insulation Mastic	Building 41, 6th Floor Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-HWS-03	Hot Water Supply Insulation Mastic	Building 41, Basement Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-HWR-03	Hot Water Return Insulation Mastic	Building 41, Basement Mechanical Room City Water	Non-Friable	Damaged	3-5% Chrysotile
B41-HWR-04A	Hot Water Return Insulation Mastic	Building 41, Floor 3 Mechanical Room 3A-130	Non-Friable	Not Damaged	3-5% Chrysotile
B41-HWX-01	Heating Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-HWX-02	Heating Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B41-HWX-03	Heating Water Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DWS-02	Domestic Water Insulation Mastic At Hangar At Wall	Building 41, Basement Mechanical Room	Non-Friable	Damaged	3-5% Chrysotile
B41-RFS-03	Sewer Drain Insulation Mastic	Building 41, Floor 5 Interstitial	Non-Friable	Not Damaged	3-5% Chrysotile
B41-RFS-04	Sewer Drain Insulation Mastic	Building 41, Floor 5 Interstitial	Non-Friable	Not Damaged	2-4% Chrysotile
B41-DS1-01	White Duct Insulation Mastic	Building 41, 6-7 Interstitial Space	Non-Friable	Damaged	3-5% Chrysotile
B41-DS1-04	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS1-05	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS1-06	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS1-07	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS2-02	White Duct Insulation Mastic On Air Handler Unit	Building 41, 5th Floor Mechanical Room	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS2-04	AHU Insulation Mastic	Building 41, Floor 6	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS2-05	AHU Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS2X-01	AHU Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-DS2X-03	AHU Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-STMX-01	Steam Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-STMX-02	Steam Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile
B41-STMX-03	Steam Insulation Mastic	Building 41, Floor 5	Non-Friable	Not Damaged	3-5% Chrysotile

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B41-HWS-04	Hot Water Supply Insulation Mastic	Building 41, Floor 7 Penthouse	Non-Friable	Not Damaged	3-5% Chrysotile

3.1.3 Building 41 - Asbestos-Containing Materials Inventory Summary

3.1.3.1 Quad A Mechanical Rooms

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at Air Handler Unit (AHU)	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
BA-114	40 linear (lin.) ft	None ID		Category II Non-Friable
1A-127	20 lin. ft.	200 sf		Category II Non-Friable
2A-112	20 lin. ft.	150 sf		Category II Non-Friable
3A-130	20 lin. ft.	150 sf		Category II Non-Friable
4A-112	20 lin. ft.	150 sf		Category II Non-Friable
5A-136	20 lin. ft.	Non suspect		Category II Non-Friable
6A-113	20 lin. ft.	150 sf		Category II Non-Friable

3.1.3.2 Quad B Mechanical Rooms

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at AHU	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
BB-111	36 lin. ft.	200 sf	200 sf tank insulation Mastic	Category II Non-Friable
1B-117	40 lin. ft.	400 sf		Category II Non-Friable
2B-117	Non suspect	Non suspect		Category II Non-Friable
3B-127	15 lin. ft.	200 sf		Category II Non-Friable
4B-117	30 lin. ft.	200 sf		Category II Non-Friable
5B-161	25 lin. ft.	200 sf		Category II Non-Friable

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at AHU	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
B-141A	HW 150 lin. ft. CHW 150 lin. ft. Dom W 3 lin. ft.			Category II Non-Friable
B-141	HW 100 lin. ft. CHW 100 lin. ft.			Category II Non-Friable

3.1.3.3 Quad C Mechanical Rooms

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at AHU	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
BC-111	36 lin. ft.	200 sf	200 sf tank insulation Mastic	Category II Non-Friable
BC-112	70 lin. ft.	None ID		Category II Non-Friable
1C-111	30 lin. ft.	350 sf		Category II Non-Friable
2C-167	8 lin. ft.	350 sf		Category II Non-Friable
3C-119A	90 lin. ft.	400 sf		Category II Non-Friable
4C-136	15 lin. ft.	200 sf		Category II Non-Friable
5C-157	140 lin. ft.	450 sf	CHW 50', HW 60', STM 30'	Category II Non-Friable

3.1.3.4 Quad D Mechanical Rooms

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at AHU	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
BD-121	70 lin. ft.	500 sf		Category II Non-Friable
1D-112	12 lin. ft.	250 sf		Category II Non-Friable
2D-126	15 lin. ft.	300 sf		Category II Non-Friable
3D-127	20 lin. ft.	150 sf		Category II Non-Friable
4D-140	20 lin. ft.	150 sf		Category II Non-Friable

Room Number	Estimated Quantity Mechanical Room Pipe Insulation Mastics/Mastics at AHU	Estimated Quantity AHU Mastic/Mastic on AHU Duct Insulation	Other	Category Material
5D-122	20 lin. ft.	150 sf		Category II Non-Friable
6D-127	12 lin. ft.	200 sf		Category II Non-Friable

3.1.3.5 Building 41 - Interstitial Spaces

Interstitial Space	Estimated Quantity Mastics/Mastics HVAC Duct Insulation	Estimated Quantity Mastic/Mastic on Drain Pipe Insulation	Category Material
Basement - First	15,500 sf	750 lin ft	Category II Non-Friable
First – Second	15,500 sf	750 lin ft	Category II Non-Friable
Second – Third	15,500 sf	750 lin ft	Category II Non-Friable
Third – Fourth	15,500 sf	750 lin ft	Category II Non-Friable
Fourth – Fifth	15,500 sf	750 lin ft	Category II Non-Friable
Fifth-Sixth	7,500 sf	500 lin ft	Category II Non-Friable
Sixth – Seventh	1,500 sf	150 lin ft	Category II Non-Friable

3.1.4 Building 41 - Inspection Notes

MEC^X sampled and determined the pipe risers relating to the mechanical systems located within the mechanical rooms do not contain asbestos.

Mechanical system piping contains TSI mastic. The TSI mastic at the junctions of the piping with the AHUs is ACM. The ACM TSI, in most cases, extends away from AHUs and then the TSI has apparently been replaced with newer TSI which is not ACM. The location where the ACM TSI transitions to non-ACM TSI varies at each location.

Asbestos-containing air handler insulation mastic was determined through sampling to be associated with the return air side of the air handling units. It appears coil and supply side of the air handler units are a different homogeneous area and do not contain asbestos.

3.1.5 Building 41 - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos

contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.1.2 above should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA) (Toxic Substances Control Act (TSCA) Title II). MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by parties, including contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the outside diameter (OD) or systems to which it is supporting.

The specific locations of TSI were not determined due to significant restrictions, which are as follows:

- Piping enclosed inside walls,
- Ceiling panel support/tie wires,
- Firewall extensions between floors throughout the plenums and
- The need to avoid creating/releasing dust inside the hospital.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.2 BUILDING 10

3.2.1 Building 10 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 10.

HA Materials		
1. 12"x12" Beige Floor Tile, Mottled & Yellow Mastic	2. 2'x4' Ceiling Tile With 2'x2' Recess Pattern	3. Steam Hard Fittings & Elbows, White Powder
4. Low Pressure Steam Hard Elbows & Fittings, White Powder	5. Gray Pebbly Sheet Vinyl	6. Red Fire Stop
7. Medium Pressure Steam, New	8. Chilled Water Mastic, New	9. Window Caulk
10. Stucco & Plaster	11. Blue Sheet Vinyl	12. Lab Counter Top
13. White 2'x4' Ceiling Tile	14. Brown Cove Base Mastic	15. White Joint Compound
16. Multi-Layered Floor Tile Elevator Floor	17. Heating (Hot) Water Insulation Mastic	18. Domestic Water Insulation Mastic
19. Gray Metal Duct Seam Mastic	20. White Chilled Water Supply Mastic	21. White Chilled Water Return Mastic
22. White Medium Pressure Steam Mastic	23. 12"x12" Beige Floor Tile, Mottled & Yellow Mastic Residual Black Mastic	24. Domestic Water Insulation Mastic

3.2.2 Building 10 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B10-STM-01	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Friable	Not Damaged	1-2% Amosite
B10-STM-02	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Friable	Not Damaged	1-2% Amosite 1-2% Chrysotile
B10-STM-03	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Friable	Not Damaged	1-2% Amosite
B10-STM-04	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Friable	Not Damaged	1-2% Amosite
B10-WC-01	White Window Caulk	Exterior Window	Friable	Not Damaged	<1% Chrysotile
B10-HW-03	Heating (Hot) Water Insulation Mastic	Building 10, Basement B2	Non-Friable	Not Damaged	3-5% Chrysotile

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B10-CHWR-03	White Chilled Water Return Mastic	Old Building 10, Penthouse	Non-Friable	Not Damaged	3-5% Chrysotile

3.2.3 Building 10 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Crawl Space Pipe Insulation Hard Fittings & Elbows	RACM	45 fittings/elbows
Basement Mechanical Room Heating (Hot) Water Insulation Mastic	Cat II Non-Friable	50 lin ft
Penthouse Mechanical Room CWR Mastic	Cat II Non-Friable	2 fittings/elbows

3.2.4 Building 10 - Inspection Notes

Asbestos-containing chilled water return line Mastic located in the Penthouse of Old Building 10 is presumed to be limited to on return line with soft elbows.

3.2.5 Building 10 - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.2.2 should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by parties, including contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the OD or systems to which it is supporting.

The specific locations of TSI were not determined due to significant restrictions, which are as follows:

- Piping enclosed inside walls,
- Ceiling panel support/tie wires,
- Firewall extensions between floors throughout the plenums and
- The need to avoid creating/releasing dust inside the hospital.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.3 BUILDING 10A

3.3.1 Building 10A - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building 10A.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building 10A.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.4 BUILDING 42

3.4.1 Building 42 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 42.

HA Materials		
1. White Joint Compound	2. Generator Exhaust Insulation & Mastic	3. Heating Water, Insulation & Mastic
4. Domestic Water, Insulation & Mastic	5. Exterior Tan Stucco & Gray Plaster	6. Exterior Louver Caulk

3.4.2 Building 42 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B42-GEX-01	Generator Exhaust Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile
B42-GEX-02	Generator Exhaust Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile
B42-GEX-03	Generator Exhaust Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile
B42-DW-01	Domestic Water, Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile
B42-DW-02	Domestic Water, Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile
B42-DW-03	Domestic Water, Insulation Mastic	Building 42, Generator Room	Non-Friable	Not Damaged	3-5% Chrysotile

3.4.3 Building 42 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Generator Exhaust Insulation Mastic	Cat II Non-Friable	75 lin ft
Domestic Water, Insulation Mastic	Cat II Non-Friable	10 lin ft

3.4.4 Building 42 - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.4.2 should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by parties, including contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the OD or systems to which it is supporting.

The specific locations of TSI were not determined due to significant restrictions, which are as follows:

- Piping enclosed inside walls,
- Ceiling panel support/tie wires and,
- Firewall extensions between floors throughout the plenums

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance

3.5 BUILDING 43

3.5.1 Building 43 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 43.

HA Materials		
1. Boiler Feed Water Insulation & Mastic	2. Boiler Blow Down Line Insulation & Mastic	3. Boiler Chemical Feed Line Insulation & Mastic
4. Steam Header Metals Plate Coating	5. Steam Header Bleed Off	6. Steam Header Mastic
7. Boiler Feed Water Insulation & Mastic Upper	8. Boiler Economizer Panel Gasket	9. Condensate Elbow Insulation & Mastic
10. Condensate Tank Insulation & Mastic	11. Domestic Water Cold Fitting Insulation and Mastic	12. Drain Line Insulation & Mastic
13. Hot Water Line Insulation & Mastic	14. Low Pressure Steam Insulation & Mastic	15. Medium Pressure Steam Insulation & Mastic
16. Chilled Water Piping Insulation & Mastic	17. Chilled Water Piping Insulation & Mastic	18. Chilled Water Chemical Supply Lines Insulation & Mastic
19. White Joint Compound	20. 2'x4' White Ceiling Tile, Specs	21. 12"x12" Beige Mottled Floor Tile & Yellow Mastic
22. Stucco & Gray Plaster	23. White Vent Piping Insulation & Mastic	24. White Bypass Piping Insulation & Mastic

3.5.2 Building 43 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B43-BFW-02	Boiler Feed Water Insulation Mastic	Boiler 3	Non-Friable	Damaged	3-5% Chrysotile
B43-BFW-03	Boiler Feed Water Insulation Mastic	Boiler 2	Non-Friable	Damaged	3-5% Chrysotile
B43-BFW-04	Boiler Feed Water Insulation Mastic	Boiler 2	Non-Friable	Damaged	3-5% Chrysotile
B43-BFW-05	Boiler Feed Water Insulation Mastic	Boiler 1	Non-Friable	Damaged	3-5% Chrysotile
B43-BDW-03	Boiler Blow Down Line Insulation Mastic	Center Boiler 2	Non-Friable	Damaged	3-5% Chrysotile

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B43-CF-03	Boiler Chemical Feed Line Insulation Mastic	Boiler 1	Non-Friable	Damaged	2-4 % Chrysotile
B43-PLC-01	Steam Header Metals Plate Coating	Steam Header	Non-Friable	Damaged	2-3% Chrysotile
B43-SHB-01	Steam Header Bleed Off	Steam Header	Non-Friable	Damaged	2-4% Chrysotile
B43-BFWT-01	Boiler Feed Water Insulation Mastic	Boiler 1	Non-Friable	Not Damaged	3-5% Chrysotile
B43-EPG-01	Boiler Economizer Panel Gasket	Boiler 1	Non-Friable	Not Damaged	95 % Chrysotile
B43-CON-01	White Condensate Elbow/Fitting Insulation Mastic	Condensate Line Adjacent To Stairs	Non-Friable	Not Damaged	3-5% Chrysotile
B43-CON-04	White Condensate Elbow Insulation Mastic	Condensate Line Adjacent To Stairs	Non-Friable	Damaged	3-5% Chrysotile
B43-CON-05	White Condensate Elbow Insulation Mastic	Condensate Line Adjacent To Stairs	Non-Friable	Damaged	3-5% Chrysotile
B43-CTNK-02	Condensate Tank Insulation Mastic	Basement Condensate Tank	Non-Friable	Not Damaged	3-5% Chrysotile
B43-LPS-01	Low Pressure Steam Insulation Mastic	Mezzanine Low Pressure Steam Line	Non-Friable	Not Damaged	3-5% Chrysotile
B43-MPS-01	Medium Pressure Steam Insulation Mastic	Mezzanine Medium Pressure Steam Line	Non-Friable	Not Damaged	3-5% Chrysotile
B43-MPS-02	Medium Pressure Steam Insulation Mastic	Mezzanine Medium Pressure Steam Line	Non-Friable	Not Damaged	3-5% Chrysotile
B43-VNT-01	White Vent Piping Insulation Mastic	Vent Lines	Non-Friable	Not Damaged	3-5% Chrysotile
B43-VNT-02	White Vent Piping Insulation Mastic	Vent Lines	Non-Friable	Not Damaged	3-5% Chrysotile
B43-VNT-03	White Vent Piping Insulation Mastic	Vent Lines	Non-Friable	Not Damaged	3-5% Chrysotile
B43-VNT-04	White Vent Piping Insulation Mastic	Vent Lines	Non-Friable	Not Damaged	3-5% Chrysotile
B43-LPS-02	Low Pressure Steam Insulation Mastic	Mezzanine Low Pressure Steam Line	Non-Friable	Not Damaged	3-5% Chrysotile
B43-LPS-03	Low Pressure Steam Insulation Mastic	Mezzanine Low Pressure Steam Line	Non-Friable	Not Damaged	3-5% Chrysotile

3.5.3 Building 43 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Boiler Feed Water Mastic	Cat II Non-Friable	60 lin ft
Boiler Blow Down Line Mastic	Cat II Non-Friable	Boiler 2 10 lin ft
Boiler Chemical Feed Line Mastic	Cat II Non-Friable	Boiler 1 10 lin ft
Condensate Elbow/Fitting Mastic	Cat II Non-Friable	150 lin ft
Condensate Tank Mastic	Cat II Non-Friable	Basement 100 sf
Low Pressure Steam Mastic	Cat II Non-Friable	Mezzanine 75 lin ft
Medium Pressure Steam Mastic	Cat II Non-Friable	Mezzanine 75 lin ft
White Vent Piping Mastic	Cat II Non-Friable	10 lin ft
Steam Header Metals Plate Coating	Cat II Non-Friable	2 sf
Steam Header Bleed Off	Cat II Non-Friable	1 fitting/elbow
Boiler Economizer Panel Gasket	Cat I	Boiler Gaskets/Seals

3.5.4 Building 43 - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.5.2 should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed be removed be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

The quantities of asbestos-containing materials are estimates made at the time of sampling and should be used by the NMVAHCS for limited budgeting purposes only. These quantities are estimates only and should be verified by parties, including contractors bidding the removal to determine exact square footage's and the accessibility of the specific materials. No mechanical as–build drawings were provided to formulate the estimate of TSI. The TSI quantities noted in the tables are total linear feet regardless of the OD or systems to which it is supporting.

The specific locations of TSI were not determined due to significant restrictions, which are as follows:

- Piping enclosed inside walls,
- Ceiling panel support/tie wires and,

- Firewall extensions between floors throughout the plenums

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance

3.6 BUILDING 43A

3.6.1 Building 43A - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 43A.

HA Materials		
1. White Pipe Mastic Mastic	2. Stucco & Gray Plaster	

3.6.2 Building 43A - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.6.3 Building 43A - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance

3.7 BUILDING 45

3.7.1 Building 45 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 45.

HA Materials		
1. 12"x12" Beige Floor Tile, Specks & Yellow Mastic	2. 12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	3. White Joint Compound
4. 12"x12" Gray, Mottled Floor Tile & Yellow Mastic	5. Green Cove Base & Yellow Mastic	6. White 2'x4' Ceiling Tile
7. Medium Pressure Steam Insulation & Mastic	8. Condensate Lines Insulation & Mastic	9. Red Metal Duct Seam Mastic
10. White Duct Insulation Mastic	11. White Metal Duct Seam Mastic	12. Red Fire Stop
13. Gray Metal Duct Seam Mastic	14. Hot Water Insulation & Mastic	15. Chilled Water System Insulation & Mastic
16. White Metal Duct Seam Mastic	17. Tan Stucco & Gray Plaster	18. 12"x12" Beige Floor Tile, Inclusions & Yellow Mastic

3.7.2 Building 45 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.7.3 Building 45 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.8 BUILDING 46

3.8.1 Building 46 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 46.

HA Materials		
1. 2'x4' White Ceiling Tile, Specs, Brown Back	2. 2'x4' White Ceiling Tile, Star Dots	3. Gray Duct Mastic Metal Duct Seams
4. White Joint Compound	5. 12"x12" White Floor Tile & Black Mastic	6. 12"x12" Beige Floor Tile, Mottled & Yellow Mastic
7. Residual Black Mastic Beneath Carpet Squares In Large Office Area		

3.8.2 Building 46 - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
B46-FT1-01	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Non-Friable	Not Damaged	5-7% Chrysotile
B46-FT1-02	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Non-Friable	Not Damaged	5-7% Chrysotile
B46-FT1-03	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Non-Friable	Not Damaged	5-7% Chrysotile
B46-RBM-01	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Non-Friable	Not Damaged	6-8% Chrysotile
B46-RBM-02	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Non-Friable	Not Damaged	6-8% Chrysotile
B46-RBM-03	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Non-Friable	Not Damaged	6-8% Chrysotile

3.8.3 Building 46 - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Black Floor Tile Mastic	Cat II Non-Friable	2,000 sf

3.8.4 Building 46 - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.8.2 above should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed be removed be removed be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.9 BUILDING 49 & 49A

3.9.1 Buildings 49 & 49A - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 49 & 49A.

HA Materials		
1. 12"x12" Cranberry Floor Tile & Yellow Mastic	2. 12"x12" Gray Floor Tile & Yellow Mastic	3. 2'x4' White Ceiling Tile With 2'x2' Recessed Pattern
4. 2'x2' White Ceiling Tile, Specs	5. 2'x4' White Ceiling Tile With 1'x1' Recessed Pattern	6. White Joint Compound
7. No Drip Tape, Black	8. Chilled Water Insulation & Mastic, White	9. Hot Water Insulation & Mastic, White
10. High Pressure Steam Insulation & Mastic, White	11. Condensate Insulation & Mastic, White	12. White Duct Insulation Mastic
13. Red Duct Mastic, Metal Duct Seams		

3.9.2 Buildings 49 & 49A - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.9.3 Buildings 49 & 49A - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.10 BUILDING 50

3.10.1 Building 50 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 50.

HA Materials		
1. 2'x4' White Ceiling Tile, Cuts & Dots	2. 12"x12" Multi-Colored Floor Tile, Heavy Mottled	3. White Joint Compound
4. Faux Wood Vinyl Flooring	5. 12"x12" Mauve Floor Tile & Yellow Mastic	

3.10.2 Building 50 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.10.3 Building 50 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.11 BUILDING 51

3.11.1 Building 51 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building 51.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building 51.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.12 BUILDING 52

3.12.1 Building 52 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 52.

HA Materials		
1. 12"x12" Brown Floor Tile & Yellow Mastic	2. White 2'x4' Ceiling Tile, Specs	3. White Joint Compound
4. Heating Water Insulation & Mastic, White	5. Red Fire Stop	6. Faux Wood Vinyl Flooring
7. Chilled Water Insulation & Mastic, White	8. Heating Water Insulation & Mastic, White	

3.12.2 Building 52 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.12.3 Building 52 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.13 BUILDING 53

3.13.1 Building 53 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 53.

HA Materials		
1. Domestic Water Insulation & Mastic, White	2. Heating Water Insulation & Mastic, White	3. Chilled Water Insulation & Mastic, White
4. 2'x2' Ceiling Tile, White	5. Red Fire Stop	6. 12"x12" Green Floor Tile & Yellow Mastic
7. White Joint Compound	8. Faux Wood Vinyl Strips	

3.13.2 Building 53 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.13.3 Building 53 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.14 BUILDING 54

3.14.1 Building 54 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 54.

HA Materials		
1. 12"x12" Beige Floor Tile, Mottled & Yellow Mastic	2. 2'x4' Ceiling Tile White, Specs	3. Yellow & Pink Fire Stop
4. Yellow Carpet Mastic		

3.14.2 Building 54 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.14.3 Building 54 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.15 BUILDING 55

3.15.1 Building 55 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 55.

HA Materials		
1. 12"x12" White Floor Tile, Gray Smudges & Yellow Mastic	2. 2'x4' White Ceiling Tile, Specs	3. Red Fire Stop
4. Yellow Carpet Mastic		

3.15.2 Building 55 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.15.3 Building 55 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.16 BUILDING 56

3.16.1 Building 56 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 56.

HA Materials		
1. White 12"x12" Floor Tile & Yellow Mastic	2. 2'x4' White Ceiling Tile, Specs	3. 2'x4' White Ceiling Tile Big Specs
4. White Joint Compound	5. Yellow Carpet Mastic	6. 12"x12" Beige Floor Tile, Mottled
7. Exterior Effis Stucco, Tan Stucco & Gray Plaster		

3.16.2 Building 56 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.16.3 Building 56 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.17 BUILDING 66

3.17.1 Building 66 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 66.

HA Materials		
1. 12"x12" White Floor Tile, Beige Spots	2. 2'x4' White Ceiling Tile, Specs	3. White Joint Compound

3.17.2 Building 66 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.17.3 Building 66 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.18 BUILDING 67

3.18.1 Building 67 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 67.

HA Materials		
1. 12"x12" White Floor Tile, Mottled & Yellow Mastic	2. Light Gray Sheet Vinyl	3. 2'x4' White Ceiling Tile
4. White Joint Compound		

3.18.2 Building 67 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.18.3 Building 67 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.19 BUILDING 67A

3.19.1 Building 67A - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building 67A.

HA Materials		
1. White Joint Compound		

3.19.2 Building 67A - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.19.3 Building 67A - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.20 BUILDING 94

3.20.1 Building 94 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building 94.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building 94.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.21 BUILDING T74

3.21.1 Building T74 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building T74.

HA Materials		
1. White Metal Duct Seam Mastic		

3.21.2 Building T74 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.21.3 Building T74 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.22 BUILDING T15C

3.22.1 Building T15C - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building T15C.

HA Materials		
1. Faux Wood Vinyl Flooring	2. White 2'x4' Ceiling Tile, Specs	3. White Joint Compound
4. Black Mirror Mastic	5. White Joint Compound	6. Yellow Rubber Flooring Mastic
7. 2'x4' White Ceiling Tile		

3.22.2 Building T15C - Samples Reported as Asbestos-Containing

Sample No.	Material Description	Sample Location	Friability	Condition	% Asbestos
BT15C-MM-01	Black Mirror Mastic	Building T15C, Mirror	Non-Friable	Not Damaged	6-8% Chrysotile
BT15C-MM-02	Black Mirror Mastic	Building T15C, Mirror	Non-Friable	Not Damaged	6-8% Chrysotile
BT15C-MM-03	Black Mirror Mastic	Building T15C, Mirror	Non-Friable	Not Damaged	6-8% Chrysotile

3.22.3 Building T15C - Asbestos-Containing Materials Inventory Summary

Material	Category	Estimated Quantity
Mirror Mastic	Cat II Non-Friable	5 sf

3.22.3 Building T15C - Conclusions

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to any renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials identified in Section 3.22.2 above should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed be removed be removed be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.23 BUILDING T15D

3.23.1 Building T15D - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building T15D.

HA Materials		
1. 12"x12" Gray Floor Tile, Mottled & Yellow Mastic	2. 12"x12" Green Floor Tile, Mottled & Yellow Mastic	3. White 2'x4' Ceiling Tile, Specs
4. Yellow Carpet Mastic		

3.23.2 Building T15D - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.23.3 Building T15D - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.24 BUILDING T60

3.24.1 Building T60 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building T60.

HA Materials		
1. Yellow Carpet Mastic	2. 12"x12" Gray Floor Tile, Mottled & Black Mastic	3. 12"x12" Pink Floor Tile, Mottled & Black Mastic
4. 12"x12" Green Floor Tile Laid On-top of Gray Floor Tile		

3.24.2 Building T60 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.24.3 Building T60 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.25 BUILDING T72

3.25.1 Building T72 - Suspect Asbestos-Containing Materials

The following table lists the HA suspect asbestos-containing materials identified and sampled within Building T72.

HA Materials		
1. White Joint Compound		

3.25.2 Building T72 - Samples Reported as Asbestos-Containing

Using PLM, the laboratory analyzed samples in the above list. Samples of the following materials contained greater than one percent (1%) asbestos as follows:

- ***None***

3.25.3 Building T72 - Asbestos-Containing Materials Inventory Summary

- ***None***

The samples of the above referenced suspect materials analyzed by Polarized Light Microscopy (PLM) using the Environmental Protection Agency EPA 600 method by a fully qualified third-party laboratory did not contain asbestos above 1.0 %. Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

Appendix A contains material descriptions and locations. Recommendations concerning the ACMs identified, if any, are based on condition, friability and potential for disturbance.

3.26 BUILDING T3

3.26.1 Building T3 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building T3.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building T3.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.27 BUILDING T51

3.27.1 Building T51 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building T51.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building T51.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.28 BUILDING T71

3.28.1 Building T71 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building T71.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building T71.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

3.29 BUILDING T73

3.29.1 Building T73 - Suspect Asbestos-Containing Materials

The following lists the HA suspect asbestos-containing materials identified within Building T73.

- **None**

MEC^X inspected the above mentioned building for the presences of suspected asbestos-containing building materials. MEC^X did not identify suspect materials; therefore, samples were not collected for Building T73.

Although this was a comprehensive asbestos survey do to the inaccessibility of some areas hidden suspect materials may exist within the building in areas such as above ceilings and in wall cavities.

4.0 CONCLUSIONS AND RECOMMENDATIONS

According to NESHAPS 40 CFR 61 Subpart M, 61.145, friable or potentially friable ACM which will be disturbed or has the potential to be disturbed during renovation, must be removed. A licensed asbestos consultant should be consulted prior to any renovation operations in a building or other structure containing ACM. The ABQ requires that Asbestos Contractors must comply with the remediation and 40-hour contractor supervisor training requirements of the Asbestos NESHAP, 40 CFR 61 Subpart M. Asbestos contractors are required to have a GB-98 general contractor's license and a GS-29 special contractor's license from the Construction Industries Division.

Based upon the results of this inspection, the materials herein identified as "asbestos-containing" should be considered as asbestos containing. MEC^X recommends that damaged asbestos-containing materials be removed in accordance with The Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763.90. MEC^X recommends that the condition of the remaining asbestos-containing materials be monitored. If the asbestos-containing materials in the unaffected areas become damaged or if they will be disturbed during renovations, then the materials should be abated in accordance with applicable federal and state laws.

Asbestos-containing materials that are present in or on the structures and will be affected by planned renovation/demolition activities must be properly removed or controlled by a registered and licensed asbestos contractor before renovation/demolition work begins.

Licensed asbestos abatement contractors with the proper bonding and experience in similar asbestos projects must perform work involving the removal of asbestos-containing materials.

This sampling report does not guarantee that additional ACM is not present. The scope of this inspection included the interior and exterior of the structure. Although the asbestos survey conducted was thorough in scope, it is important to identify those materials that were not encountered during the survey so that if they are encountered during renovation activities, these materials can be considered ACM until testing proves otherwise. The materials that should be assumed to contain asbestos if encountered include:

The materials that should be assumed to contain asbestos if encountered include:

- High Temperature Gaskets and Packing Materials;
- Concealed construction mastics and vapor barrier;
- Resilient floor coverings and mastic located under carpet or existing flooring; and
- Electrical panel partitions/equipment.

Should additional suspect materials, not specifically identified within this report, be encountered during construction, demolition or renovation activities, they should be treated as asbestos-containing until further asbestos bulk sampling and analysis can be performed. The analytical results pertain to only the samples analyzed and may not reflect the actual composition of the entire homogeneous area. MEC^X assumes no responsibility for subsequent use or interpretations of these analytical results. This report must not be used to claim product endorsement by NVLAP or other state or federal government agency.

Prior to the removal of asbestos-containing materials the quantities should be verified by a licensed abatement contractor.

5.0 LIMITATIONS

MEC^X warrants that the findings contained herein have been prepared with the level of skill exercised by experienced and knowledgeable environmental consultants who are appropriately licensed or otherwise trained to perform assessments pursuant to the scope of work required on this project.

The work that was performed during this investigation was done at the request of the client or the client's representative. The investigation was done so in a non-destructive manner. No repairs of the materials sampled were undertaken in the execution of this survey.

Materials may exist in inaccessible or hidden areas of the facility that were not observed or inspected during this investigation. This inspection was conducted as a complete facility survey or inspection but due to the inaccessibility of some areas and cavities in the buildings hidden materials may exist, that will only be accessible through demolition. Hidden materials may include, but are not limited to: TSI covered with metal jacketing, gasket material at pipe connections between flanges, vent pipe or duct insulation within wall cavities, vinyl floor tile or sheet flooring beneath sub-floors or overlays, spray-on acoustic texture hidden by door jams or covered with drywall.

The quantification of the asbestos-containing materials are estimates made at the time of sampling. The quantities are estimates only and should be verified by the contractors bidding the project to determine exact square footage's and the accessibility of the specific materials.

The opinions and conclusions presented here are based on field investigation and observations made in the field and are consistent with practices and actions of consulting professionals in the asbestos and industrial hygiene field.

6.0 ASBESTOS SURVEY SAMPLING STRATEGY

The following illustrates the sampling strategy employed by MEC^X:

(a) Surfacing materials - In a randomly distributed manner, an accredited asbestos inspector collected bulk samples of surfacing materials, representative of each homogeneous area, unless it was assumed to be an asbestos-containing material (ACM), as follows:

(1) Collect at least three bulk samples from each homogeneous area that is less than or equal to 1,000 ft^2.

(2) Collect at least five bulk samples from each homogeneous area that is greater than 1,000 ft^2, but less than or equal to 5,000 ft^2.

(3) Collect at least seven bulk samples from each homogeneous area that is greater than 5,000 ft^2.

(b) Thermal systems insulation - In a randomly distributed manner, an accredited asbestos inspector collected, at a minimum, three (3) bulk samples of thermal systems insulation material, representative of each homogeneous area, unless it was assumed to be ACM, as follows:

(1) An accredited asbestos inspector collected, at a minimum, one (1) bulk sample of patched thermal systems insulation, representative of each homogenous area, unless it was assumed to be ACM, providing the section of patch was less than 6 linear or square feet.

(2) An accredited asbestos inspector collected, at a minimum, three (3) representative bulk samples of each insulated mechanical system, unless it was assumed to be ACM, including, but not limited to cementitious material used on fittings such as tees, elbows or valves. Representative sampling was conducted in a manner sufficient as to identify whether each homogenous area was either asbestos or non-asbestos containing.

(c) Miscellaneous materials - An accredited asbestos inspector collected, at a minimum, three (3) representative bulk samples of each miscellaneous material not assumed to be ACM, including, but not limited to ceiling tiles, floor tiles, associated floor tile mastic, etc. Representative sampling was conducted in a manner sufficient as to identify whether each homogenous area is either asbestos or non-asbestos containing.

(d) Bulk samples are not required to be collected from homogeneous area where the accredited asbestos inspector has determined that the thermal systems insulation is a non-suspect material (e.g., fiberglass, foam glass, rubber or other non-ACM).

(e) For the purpose of this report, MEC^X has classified the asbestos-containing materials as not damaged, damaged or significantly damaged and defined as follows:

- Damaged friable miscellaneous ACM means friable miscellaneous ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that its bond to the substrate (adhesion) is inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of

physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

- Damaged friable surfacing ACM means friable surfacing ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or which has delaminated such that its bond to the substrate (adhesion) is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.
- Damaged or significantly damaged thermal system insulation ACM means thermal system insulation ACM on pipes, boilers, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from the ACBM in question may also indicate damage.

APPENDIX A
ASBESTOS SUMMARY TABLE

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	FT1	B10-FT1-01	2	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 10, 2nd & 1st Floor Hallways & Stairwell Landings	2nd Floor Hallway	Non-Detect
10	FT1	B10-FT1-02	2	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic Residual Black Mastic	Building 10, 2nd & 1st Floor Hallways & Stairwell Landings	2nd Floor Stairwell Landing	Non-Detect
10	FT1	B10-FT1-03	2	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic Residual Black Mastic	Building 10, 2nd & 1st Floor Hallways & Stairwell Landings	2nd Floor Stairwell Landing	Non-Detect
10	FT1	B10-FT1-04	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 10, 2nd & 1st Floor Hallways & Stairwell Landings	1st Floor Hallway	Non-Detect
10	FT1	B10-FT1-05	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 10, 2nd & 1st Floor Hallways & Stairwell Landings	1st Floor North Office	Non-Detect
10	CT1	B10-CT1-01	2	Misc.	Not Damaged	2'x4' Ceiling Tile With 2'x2' Recess Pattern	Building 10, Ceilings Throughout	2nd Floor Hallway	Non-Detect
10	CT1	B10-CT1-02	2	Misc.	Not Damaged	2'x4' Ceiling Tile With 2'x2' Recess Pattern	Building 10, Ceilings Throughout	2nd Floor Office 217	Non-Detect
10	CT1	B10-CT1-03	2	Misc.	Not Damaged	2'x4' Ceiling Tile With 2'x2' Recess Pattern	Building 10, Ceilings Throughout	2nd Floor Office 201	Non-Detect
10	CT1	B10-CT1-04	1	Misc.	Not Damaged	2'x4' Ceiling Tile With 2'x2' Recess Pattern	Building 10, Ceilings Throughout	1st Floor Office 114	Non-Detect
10	CT1	B10-CT1-05	1	Misc.	Not Damaged	2'x4' Ceiling Tile With 2'x2' Recess Pattern	Building 10, Ceilings Throughout	1st Floor Corridor	Non-Detect
10	STM	B10-STM-01	B	TSI	Not Damaged	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Basement Room Adjacent To Mechanical Room	1-2% Amosite
10	STM	B10-STM-02	B	TSI	Not Damaged	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Basement Crawl Space	1-2% Amosite 1-2% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	STM	B10-STM-03	B	TSI	Not Damaged	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Basement Crawl Space	1-2% Amosite
10	STM	B10-STM-04	B	TSI	Not Damaged	Steam Hard Fittings & Elbows, White Powder	Building 10, Basement, Mechanical Room & Crawl Space	Basement Crawl Space	1-2% Amosite
10	LPS	B10-LPS-01	New Bldg. BCS	TSI	Not Damaged	Low Pressure Steam Hard Elbows & Fittings, White Powder	Building 10, New Building, Crawl Space/Sub Floor	Basement Crawl Space/Sub Floor	Non-Detect
10	LPS	B10-LPS-02	New Bldg. BCS	TSI	Not Damaged	Low Pressure Steam Hard Elbows & Fittings, White Powder	Building 10, New Building, Crawl Space/Sub Floor	Basement Crawl Space/Sub Floor	Non-Detect
10	SV1	B10-SV1-01	2	Misc.	Not Damaged	Gray Pebbly Sheet Vinyl	Building 10, New Building	2nd Floor, Office 215	Non-Detect
10	SV1	B10-SV1-02	1	Misc.	Not Damaged	Gray Pebbly Sheet Vinyl	Building 10, New Building	1st Floor, Office 113	Non-Detect
10	SV1	B10-SV1-03	1	Misc.	Not Damaged	Gray Pebbly Sheet Vinyl	Building 10, New Building	1st Floor, Office 101	Non-Detect
10	RFS	B10-RFS-01	B	Misc.	Not Damaged	Red Fire Stop	Building 10, Basement	Basement	Non-Detect
10	RFS	B10-RFS-02	B	Misc.	Not Damaged	Red Fire Stop	Building 10, Basement	Basement	Non-Detect
10	RFS	B10-RFS-03	B	Misc.	Not Damaged	Red Fire Stop	Building 10, Basement	Basement	Non-Detect
10	MPSN	B10-MPSN-01	PH10	TSI	Not Damaged	Medium Pressure Steam, New	New Building 10, Penthouse	Basement, New Penthouse	Non-Detect
10	CHWN	B10-CHWN-01	PH	TSI	Not Damaged	Chilled Water Sealant, New	New Building 10, Penthouse	Basement, New Penthouse	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	WC	B10-WC-01	Ext.	Misc.	Not Damaged	Window Caulk	Building 10, Exterior Windows	Exterior Windows	<1 % Chrysotile
10	WC	B10-WC-02	Ext.	Misc.	Not Damaged	Window Caulk	Building 10, Exterior Windows	Exterior Windows	Non-Detect
10	WC	B10-WC-03	Ext.	Misc.	Not Damaged	Window Caulk	Building 10, Exterior Windows	Exterior Windows	Non-Detect
10	STC	B10-STC-01	Ext.	Misc.	Not Damaged	Stucco & Plaster	Building 10, Exterior Walls	Exterior Walls	Non-Detect
10	STC	B10-STC-02	Ext.	Misc.	Not Damaged	Stucco & Plaster	Building 10, Exterior Walls	Exterior Walls	Non-Detect
10	STC	B10-STC-03	Ext.	Misc.	Not Damaged	Stucco & Plaster	Building 10, Exterior Walls	Exterior Walls	Non-Detect
10	SV2	B10-SV2-01	1	Misc.	Not Damaged	Blue Sheet Vinyl	Building 10, New Construction Animal Research	New Construction Animal Research	Non-Detect
10	LCT	B10-LCT-01	B	Misc.	Not Damaged	Lab Counter Top	Building 10, Basement	Basement	Non-Detect
10	CT2	B10-CT2-01	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 10, New Construction Animal Research	1st Floor Corridor	Non-Detect
10	CT2	B10-CT2-02	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 10, New Construction Animal Research	1st Floor Corridor	Non-Detect
10	CT2	B10-CT2-03	2	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 10, New Construction Animal Research	2nd Floor Corridor	Non-Detect
10	CBM	B10-CBM-01	B	Misc.	Not Damaged	Brown Cove Base Mastic	Building 10, Basement	Basement	Non-Detect
10	CBM	B10-CBM-02	B	Misc.	Not Damaged	Brown Cove Base Mastic	Building 10, Basement	Basement	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	CBM	B10-CBM-03	B	Misc.	Not Damaged	Brown Cove Base Mastic	Building 10, Basement	Basement	Non-Detect
10	JC	B10-JC-01	2	Misc.	Not Damaged	White Joint Compound	Building 10, Walls Throughout	2nd Floor Corridor	Non-Detect
10	JC	B10-JC-02	2	Misc.	Not Damaged	White Joint Compound	Building 10, Walls Throughout	2nd Floor Lab	Non-Detect
10	JC	B10-JC-03	B	Misc.	Not Damaged	White Joint Compound	Building 10, Walls Throughout	Basement	Non-Detect
10	JC	B10-JC-04	1	Misc.	Not Damaged	White Joint Compound	Building 10, Walls Throughout	1st Floor New Construction Animal Research	Non-Detect
10	JC	B10-JC-05	2	Misc.	Not Damaged	White Joint Compound	Building 10, Walls Throughout	2nd Floor New Construction Animal Research	Non-Detect
10	FT2	B10-FT2-01	Elevator	Misc.	Not Damaged	Multi-Layered Floor Tile Elevator Floor	Building 10, Elevator	Elevator	Non-Detect
10	FT2	B10-FT2-02	Elevator	Misc.	Not Damaged	Multi-Layered Floor Tile Elevator Floor	Building 10, Elevator	Elevator	Non-Detect
10	FT2	B10-FT2-03	Elevator	Misc.	Not Damaged	Multi-Layered Floor Tile Elevator Floor	Building 10, Elevator	Elevator	Non-Detect
10	HW	B10-HW-01	B	TSI	Not Damaged	Heating (Hot) Water Insulation Sealant	Building 10, Basement B2	Basement B2	Non-Detect
10	HW	B10-HW-02	B	TSI	Not Damaged	Heating (Hot) Water Insulation Sealant	Building 10, Basement B2	Basement B2	Non-Detect
10	HW	B10-HW-03	B	TSI	Not Damaged	Heating (Hot) Water Insulation Sealant	Building 10, Basement B2	Basement B2	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	DW	B10-DW-01	B	TSI	Not Damaged	Domestic Water Insulation Sealant	Building 10, Basement B2	Basement B2	Non-Detect
10	DW	B10-DW-02	B	TSI	Not Damaged	Domestic Water Insulation Sealant	Building 10, Basement B2	Basement B2	Non-Detect
10	DW	B10-DW-03	B	TSI	Not Damaged	Domestic Water Insulation Mastic	Building 10, Basement B2	Basement B2	Non-Detect
10	GDS	B10-GDS-01	PH	Misc.	Not Damaged	Gray Metal Duct Seam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	GDS	B10-GDS-02	PH	Misc.	Not Damaged	Gray Metal Duct Seam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	GDS	B10-GDS-03	PH	Misc.	Not Damaged	Gray Metal Duct Seam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWS	B10-CHWS-01	PH	TSI	Not Damaged	White Chilled Water Supply Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWS	B10-CHWS-02	PH	TSI	Not Damaged	White Chilled Water Supply Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWS	B10-CHWS-03	PH	TSI	Not Damaged	White Chilled Water Supply Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWR	B10-CHWR-01	PH	TSI	Not Damaged	White Chilled Water Return Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWR	B10-CHWR-02	PH	TSI	Not Damaged	White Chilled Water Return Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	CHWR	B10-CHWR-03	PH	TSI	Not Damaged	White Chilled Water Return Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
10	MPS	B10-MPS-01	PH	TSI	Not Damaged	White Medium Pressure Steam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	MPS	B10-MPS-02	PH	TSI	Not Damaged	White Medium Pressure Steam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect
10	MPS	B10-MPS-03	PH	TSI	Not Damaged	White Medium Pressure Steam Sealant	Old Building 10, Penthouse	Old Bldg. 10 Penthouse	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CT3	B41-CT3-01	6	Misc.	Not Damaged	2'x2' White Recessed Grid, No Cuts	Building 41, 6th Floor Ceilings	6C-128	ND
41	CT3	B41-CT3-02	6	Misc.	Not Damaged	2'x2' White Recessed Grid, No Cuts	Building 41, 6th Floor Ceilings	6C-Nurses Station	ND
41	CT3	B41-CT3-03	6	Misc.	Not Damaged	2'x2' White Recessed Grid, No Cuts	Building 41, 6th Floor Ceilings	6C-149	ND
41	SV2	B41-SV2-01	6	Misc.	Not Damaged	Sheet Vinyl Flooring, New, Blue, Tan & Faux Wood	Building 41, 6th Floor	6C-149	ND
41	SV2	B41-SV2-02	6	Misc.	Not Damaged	Sheet Vinyl Flooring, New, Blue, Tan & Faux Wood	Building 41, 6th Floor	6C-Nurses Station	ND
41	SV2	B41-SV2-03	6	Misc.	Not Damaged	Sheet Vinyl Flooring, New, Blue, Tan & Faux Wood	Building 41, 6th Floor	6C-122	ND
41	JC	B41-JC-01	6	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	6C-147	ND
41	FT5	B41-FT5-01	6	Misc.	Not Damaged	12"x12" Floor Tile, Black Smudges & Yellow Mastic	Building 41, 6th Floor Stairwell	6th Floor Stairwell	ND
41	FT2	B41-FT2-01	6	Misc.	Not Damaged	12"x12" Olive Floor Tile & Yellow Mastic	Building 41, 6th Floor	6th Floor Corridor At Stairwell 6	ND
41	JC	B41-JC-02	6	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	6B-102	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CPM	B41-CPM-01	6	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	6B-102	ND
41	FT2	B41-FT2-02	6	Misc.	Not Damaged	12"x12" Olive Floor Tile & Yellow Mastic	Building 41, 6th Floor	6A-133A	ND
41	JC	B41-JC-03	6	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	6A-133A	ND
41	FT1A	B41-FT1A-01	6	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 6th Floor	6A Stairwell 1	ND
41	CHWS	B41-CHWS-01	6	TSI	Damaged	Chilled Water Supply Mastic	Building 41, 6th Floor Mechanical Room	6A-113	3-5% Chrysotile
41	CHWR	B41-CHWR-01	6	TSI	Damaged	Chilled Water Return Mastic	Building 41, 6th Floor Mechanical Room	6A-113	3-5% Chrysotile
41	HWS	B41-HWS-01	6	TSI	Damaged	White Hot Water Supply Mastic	Building 41, 6th Floor Mechanical Room	6A-113	3-5% Chrysotile
41	HWR	B41-HWR-01	6	TSI	Damaged	Hot Water Return Mastic	Building 41, 6th Floor Mechanical Room	6A-113	ND
41	FT4	B41-FT4-01	6	Misc.	Not Damaged	12"x12" Taupe Floor Tile, Heavy Mottled & Yellow Mastic	Building 41, 6th Floor	6D-104	ND
41	FT1	B41-FT1-01	6	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 6th Floor	6D-118	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	JC	B41-JC-04	6	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	6D-127	ND
41	SV1	B41-SV1-01	6	Misc.	Not Damaged	Tan Sheet Vinyl	Building 41, 6th Floor	6D-118	ND
41	FP1	B41-FP1-01	6 Interstitial	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, 6-7 Interstitial Space	6-7 Interstitial At Column C3	ND
41	FP2	B41-FP2-01	6 Interstitial	Surfacing	Not Damaged	Troweled Applied Fire Proofing	Building 41, 6-7 Interstitial Space	6-7 Interstitial At Column C3	ND
41	DS1	B41-DS1-01	6+	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, 6-7 Interstitial Space	6-7 Interstitial At Column C3	3-5% Chrysotile
41	GDS	B41-GDS-01	6 Interstitial	Misc.	Not Damaged	Gray Duct Mastic On Metal Ducts	Building 41, 6-7 Interstitial Space	6-7 Interstitial At Building Core	ND
41	FT3	B41-FT3-01	6	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	Building 41, Elevator Lobby Areas	6th Floor Elevator Lobby	ND
41	FT5	B41-FT5-02	5	Misc.	Not Damaged	12"x12" Floor Tile, Black Smudges & Yellow Mastic	Building 41, 5th Floor	5B-100	ND
41	WV1	B41-WV1-01	5	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Narrow Strips	Building 41, 5th Floor	5B-160	ND
41	CT2	B41-CT2-01	5	Misc.	Not Damaged	2'X4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 5th Floor Ceilings	5B-160	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

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41	CT1	B41-CT1-01	5	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 5th Floor Ceilings	5B-121	ND
41	FT1A	B41-FT1A-02	5	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 5th Floor	Stairwell 5	ND
41	FT2	B41-FT2-03	5	Misc.	Not Damaged	12"x12" Olive Floor Tile & Yellow Mastic	Building 41, 5th Floor	5A-138	ND
41	JC	B41-JC-05	5	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	5A-138	ND
41	JC	B41-JC-06	5	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	Hall At 5D-145	ND
41	JC	B41-JC-07	5	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	5C-138	ND
41	FT1A	B41-FT1A-03	5	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 5th Floor	5C-129	ND
41	FP1	B41-FP1-02	5	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, 5th Floor	Hallway At 5C-127	ND
41	RFS	B41-RFS-01	5	Misc.	Not Damaged	Red Fire Stop	Building 41, 5th Floor, Floor & Wall Penetrations	Hallway At 5C-127	ND
41	JC	B41-JC-08	5	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	5B-130	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CT1	B41-CT1-02	5	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 5th Floor Ceilings	5B-130	ND
41	WV1	B41-WV1-02	5	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Narrow Strips	Building 41, 5th Floor	5B Corridor	ND
41	FT3	B41-FT3-02	5	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	Building 41, Elevator Lobby Areas	5th Floor Elevator Lobby	ND
41	FT1	B41-FT1-02	4	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 4th Floor	4A Corridor	ND
41	CT1	B41-CT1-03	4	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 4th Floor Ceiling	4A Corridor	ND
41	FSP	B41-FSP-01	4	Misc.	Not Damaged	Gray Fire Stop Plaster	Building 41, Mechanical Rooms & Interstitial Spaces	4A-112	ND
41	GDS	B41-GDS-02	4	Misc.	Not Damaged	Gray Duct Mastic On Metal Ducts	Building 41, White Duct Mastic On Metal Duct Seams	4A-112	ND
41	CHWS	B41-CHWS-02	4	TSI	Not Damaged	Chilled Water Supply Mastic	Building 41, 4th Floor Mechanical Room	4A-112	3-5% Chrysotile
41	CHWR	B41-CHWR-02	4	TSI	Not Damaged	Chilled Water Return Mastic	Building 41, 4th Floor Mechanical Room	4A-112	3-5% Chrysotile
41	HWS	B41-HWS-02	4	TSI	Not Damaged	White Hot Water Supply Mastic	Building 41, 4th Floor Mechanical Room	4A-112	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	HWR	B41-HWR-02	4	TSI	Not Damaged	Hot Water Return Mastic	Building 41, 4th Floor Mechanical Room	4A-112	ND
41	RDS	B41-RDS-01	4	Misc.	Not Damaged	Red Metal Duct Mastic On Metal Duct Seams	Building 41, 4th Floor Mechanical Room	4A-112	ND
41	RFS	B41-RFS-02	4	Misc.	Not Damaged	Red Fire Stop	Building 41, 4th Floor, Floor & Wall Penetrations	4A-112	ND
41	JC	B41-JC-09	4	Misc	Not Damaged	White Joint Compound	Building 41, Walls Throughout	4A Corridor	ND
41	CPM	B41-CPM-02	4	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	4B-163	ND
41	JC	B41-JC-10	4	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	4B-114	ND
41	FT1A	B41-FT1A-04	4	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 4th Floor	4B-145	ND
41	CPM	B41-CPM-03	4	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	4B-114	ND
41	JC	B41-JC-11	4	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	4C Corridor	ND
41	FT3	B41-FT3-03	4	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	Building 41, 4th Floor	4C Corridor	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

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41	WV1	B41-WV1-03	4	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Narrow Strips	Building 41, 4th Floor	4D Corridor	ND
41	JC	B41-JC-12	4	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	4D Corridor	ND
41	FT5	B41-FT5-03	3	Misc.	Not Damaged	12"x12" Floor Tile, Black Smudges & Yellow Mastic	Building 41, 3rd Floor	3rd Floor Stairwell 6	ND
41	WV2	B41-WV2-01	3	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Wider Strips	Building 41, 3rd Floor	3A Corridor	ND
41	JC	B41-JC-13	3	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	3A-109	ND
41	CT2	B41-CT2-02	3	Misc.	Not Damaged	2'X4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 3rd Floor Ceilings	3A Corridor	ND
41	WV2	B41-WV2-02	3	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Wider Strips	Building 41, 3rd Floor	3A Corridor	ND
41	FT1A	B41-FT1A-05	3	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 3rd Floor	3A-144	ND
41	FT10	B41-FT10--01	3	Misc.	Not Damaged	12"x12" Pink & Blue Floor Tile & Yellow Mastic	Building 41, 3rd Floor	3A-148	ND
41	FT10	B41-FT10--02	3	Misc.	Not Damaged	12"x12" Pink & Blue Floor Tile & Yellow Mastic	Building 41, 3rd Floor	3A-148	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT10	B41-FT10--03	3	Misc.	Not Damaged	12"x12" Pink & Blue Floor Tile & Yellow Mastic	Building 41, 3rd Floor	3A-148	ND
41	JC	B41-JC-14	3	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	3D-97	ND
41	CT1	B41-CT1-04	3	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 3rd Floor Ceiling	3D Corridor	ND
41	WV2	B41-WV2-03	3	Misc.	Not Damaged	Faux Wood Sheet Vinyl, Wider Strips	Building 41, 3rd Floor	3D-300	ND
41	FT1A	B41-FT1A-06	3	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, 3rd Floor	3C Corridor	ND
41	JC	B41-JC-15	3	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	3C-100A Corridor	ND
41	JC	B41-JC-16	3	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	3B-124	ND
41	CT2	B41-CT2-03	3	Misc.	Not Damaged	2'X4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 3rd Floor Ceilings	3B Corridor	ND
41	RDS	B41-RDS-02	3	Misc.	Not Damaged	Red Metal Duct Mastic On Metal Duct Seams	Building 41, 3rd Floor Mechanical Room	3B-127	ND
41	RFS	B41-RFS-03	3	Misc.	Not Damaged	Red Fire Stop	Building 41, 3rd Floor, Floor & Wall Penetrations	3B-127	ND
41	RFS	B41-RFS-04	3	Misc.	Not Damaged	Red Fire Stop	Building 41, 3rd Floor, Floor & Wall Penetrations	3B-127	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	DS1	B41-DS1-02	3 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, 3-4 Interstitial Space	Floors 3-4 Interstitial Space	ND
41	GDS	B41-GDS-03	3 Interstitial	Misc.	Not Damaged	Gray Duct Mastic On Metal Ducts	Building 41, White Duct Mastic On Metal Duct Seams	Floors 3-4 Interstitial Space	ND
41	FP1	B41-FP1-03	3 Interstitial	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, Mechanical Rooms & Interstitial Spaces	Floors 3-4 Interstitial Space	ND
41	FSP	B41-FSP-02	3 Interstitial	Surfacing	Not Damaged	Gray Fire Stop Plaster	Building 41, Mechanical Rooms & Interstitial Spaces	Floors 3-4 Interstitial Space	ND
41	DS1	B41-DS1-03	2+	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, 2-3 Interstitial Space	Floors 2-3 Interstitial Space	ND
41	FT1	B41-FT1-03	2	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 2nd Floor	2B Corridor	ND
41	JC	B41-JC-17	2	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	2B-114A	ND
41	CT1	B41-CT1-05	2	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 2nd Floor Ceiling	2B-128	ND
41	FT1	B41-FT1-04	2	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 2nd Floor	2B-128	ND
41	CT2	B41-CT2-04	2	Misc.	Not Damaged	2'X4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 2nd Floor Ceilings	2C Corridor	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	JC	B41-JC-18	2	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	2C Corridor	ND
41	FT1	B41-FT1-05	2	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 2nd Floor	2C-109	ND
41	FP1	B41-FP1-04	2	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, Mechanical Rooms & Interstitial Spaces	2D-222	ND
41	CPM	B41-CPM-04	2	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	2A-100	ND
41	JC	B41-JC-19	2	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	2A-108	ND
41	FT9	B41-FT9-01	2	Misc.	Not Damaged	12"x12" Sand White Floor Tile & Yellow Mastic	Building 41, 2nd Floor	2A-108	ND
41	FT9	B41-FT9-02	2	Misc.	Not Damaged	12"x12" Sand White Floor Tile & Yellow Mastic	Building 41, 2nd Floor	2A-108	ND
41	FT9	B41-FT9-03	2	Misc.	Not Damaged	12"x12" Sand White Floor Tile & Yellow Mastic	Building 41, 2nd Floor	6A-114	ND
41	JC	B41-JC-20	1	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	Cashier Lobby	ND
41	FT1	B41-FT1-06	1	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 1st Floor	1C-102A	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CT1	B41-CT1-06	1	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 1st Floor Ceiling	1C Corridor	ND
41	SV3	B41-SV3-01	1	Misc.	Not Damaged	Gray Pebbly	Building 41, 1st Floor	1C-128	ND
41	FT1	B41-FT1-07	1	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 1st Floor	1st Floor Stairwell 3	ND
41	JC	B41-JC-21	1	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	1C-160A	ND
41	FT1	B41-FT1-08	1	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 1st Floor	1B Corridor At 1B-105	ND
41	CT1	B41-CT1-07	1	Misc.	Not Damaged	2'X4' White Ceiling Tile, Cuts & Dots, Old	Building 41, 1st Floor Ceiling	1B Corridor	ND
41	SV4	B41-SV4-01	1	Misc.	Not Damaged	Tan Mottled Sheet Vinyl	Building 41, 1st Floor	1B-108	ND
41	SV4	B41-SV4-02	1	Misc.	Not Damaged	Tan Mottled Sheet Vinyl	Building 41, 1st Floor	1B-108	ND
41	SV4	B41-SV4-03	1	Misc.	Not Damaged	Tan Mottled Sheet Vinyl	Building 41, 1st Floor	1B-108	ND
41	FT2	B41-FT2-04	1	Misc.	Not Damaged	12"x12" Olive Floor Tile & Yellow Mastic	Building 41, 1st Floor	1B 167	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT11	B41-FT11-01	1	Misc.	Not Damaged	12"x12" Taupe Floor Tile & Yellow Mastic	Building 41, 1st Floor	1B-169 ER	ND
41	FT11	B41-FT11-02	1	Misc.	Not Damaged	12"x12" Taupe Floor Tile & Yellow Mastic	Building 41, 1st Floor	1B-157 ER	ND
41	FT11	B41-FT11-03	1	Misc.	Not Damaged	12"x12" Taupe Floor Tile & Yellow Mastic	Building 41, 1st Floor	1B Nurses Station ER	ND
41	DS2	B41-DS2-01	1	Misc.	Not Damaged	White Duct Insulation Mastic On Air Handler Unit	Building 41, 1st Floor Mechanical Room	1B-117	ND
41	STC	B41-STC-01	1	Misc.	Not Damaged	Tan Exterior Stucco & Plaster	Exterior Wall	ER Entrance	ND
41	CT2	B41-CT2-05	1	Misc.	Not Damaged	2'X4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 1st Floor Ceilings	1B-150A Police Window	ND
41	FT1	B41-FT1-09	1	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 1st Floor	ER Entrance	ND
41	CT5	B41-CT5-01	1	Misc.	Not Damaged	2'x4' Smooth Ceiling Tile	Building 41, 1st Floor	1B-130	ND
41	FT7	B41-FT7-01	1	Misc.	Not Damaged	12"x12" Cranberry Mottled Floor Tile & Yellow Mastic	Building 41, 1st Floor	MRI Corridor	ND
41	FT7	B41-FT7-02	1	Misc.	Not Damaged	12"x12" Cranberry Mottled Floor Tile & Yellow Mastic	Building 41, 1st Floor	MRI Corridor	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT7	B41-FT7-03	1	Misc.	Not Damaged	12"x12" Cranberry Mottled Floor Tile & Yellow Mastic	Building 41, 1st Floor	MRI Corridor	ND
41	FT6	B41-FT6-01	1	Misc.	Not Damaged	12"x12" Peach Floor Tile & Yellow Mastic	Building, 1st Floor	GU Clinic Hallway	ND
41	FT6	B41-FT6-02	1	Misc.	Not Damaged	12"x12" Peach Floor Tile & Yellow Mastic	Building, 1st Floor	GU Clinic Hallway	ND
41	FT6	B41-FT6-03	1	Misc.	Not Damaged	12"x12" Peach Floor Tile & Yellow Mastic	Building, 1st Floor	GU Clinic Hallway	ND
41	CT2	B41-CT2-06	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, 1st Floor Ceilings	GU Clinic Hallway	ND
41	FP1	B41-FP1-05	1	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41,1st Floor Construction Area & Mechanical Rooms & Interstitial Spaces	Construction Area	ND
41	CPM	B41-CPM-05	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	1D-113 Corridor	ND
41	SV3	B41-SV3-02	1	Misc.	Not Damaged	Gray Pebbly	Building 41, 1st Floor	Pharmacy Controlled Substance Vault	ND
41	JC	B41-JC-22	1	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	Pharmacy	ND
41	FT1	B41-FT1-10	1	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, 1st Floor	Pharmacy	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT3	B41-FT3-05	B	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	Building 41, Basement	Basement Service Elevator Lobby	ND
41	JC	B41-JC-23	B	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	Lab BA-113	ND
41	CT2	B41-CT2-07	B	Misc.	Not Damaged	2'x4' White Ceiling Tile, Small Cuts & Dots, New	Building 41, Basement Ceilings	Basement Stairwell 1	ND
41	FT1	B41-FT1-11	B	Misc.	Not Damaged	12"x12" Beige Floor Tile With Mottling & Yellow Mastic	Building 41, Basement Floor	Basement Stairwell 1	ND
41	STM	B41-STM-01	B	Misc.	Not Damaged	Stair Tread Black Mastic	Building 41, Stairwells	Basement Stairwell 2	ND
41	CT6	B41-CT6-01	B	Misc.	Not Damaged	2'x2' White Ceiling Tile Dots	Building 41, Kitchen/Food Prep Area	Building 41, Kitchen/Food Prep Area	ND
41	CT6	B41-CT6-02	B	Misc.	Not Damaged	2'x2' White Ceiling Tile Dots	Building 41, Kitchen/Food Prep Area	Building 41, Kitchen/Food Prep Area	ND
41	CT6	B41-CT6-03	B	Misc.	Not Damaged	2'x2' White Ceiling Tile Dots	Building 41, Kitchen/Food Prep Area	Building 41, Kitchen/Food Prep Area	ND
41	FT12	B41-FT12-01	B	Misc.	Not Damaged	12"x12" White Floor Tile With Gray Spots	Building 41, Basement Floor	BC-130	ND
41	FT12	B41-FT12-02	B	Misc.	Not Damaged	12"x12" White Floor Tile With Gray Spots	Building 41, Basement Floor	BC-130	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT12	B41-FT12-03	B	Misc.	Not Damaged	12"x12" White Floor Tile With Gray Spots	Building 41, Basement Floor	BC-130	ND
41	JC	B41-JC-24	B	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	BC-130	ND
41	CPM	B41-CPM-06	B	Misc.	Not Damaged	Yellow Carpet Mastic	Building 41, Select Carpets	BC-125	ND
41	CT7	B41-CT7-01	B	Misc.	Not Damaged	2'x4' Ceiling Tile Squiggle Cuts	Building 41, Basement Ceilings	BC-121C	ND
41	CT7	B41-CT7-02	B	Misc.	Not Damaged	2'x4' Ceiling Tile Squiggle Cuts	Building 41, Basement Ceilings	BC-121C	ND
41	CT7	B41-CT7-03	B	Misc.	Not Damaged	2'x4' Ceiling Tile Squiggle Cuts	Building 41, Basement Ceilings	BC-121C	ND
41	FT1A	B41-FT1A-07	B	Misc.	Not Damaged	12"x12" Gray Mottled Floor Tile & Yellow Mastic (Replacement Tile For FT1)	Building 41, Basement Floor	BC Corridor	ND
41	JC	B41-JC-25	B	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	B-110	ND
41	RDS	B41-RDS-03	B	Misc.	Not Damaged	Red Metal Duct Mastic On Metal Duct Seams	Building 41, Basement Mechanical Room	B-110	ND
41	CHWS	B41-CHWS-03	B	TSI	Not Damaged	Chilled Water Supply Mastic	Building 41, Basement Mechanical Room	BD-141A	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CHWR	B41-CHWR-03	B	TSI	Not Damaged	Chilled Water Return Mastic	Building 41, Basement Mechanical Room	BD-141A	3-5% Chrysotile
41	HWS	B41-HWS-03	B	TSI	Not Damaged	White Hot Water Supply Mastic	Building 41, Basement Mechanical Room	BD-141A	3-5% Chrysotile
41	DWS	B41-DWS-01	B	TSI	Not Damaged	Domestic Water Mastic At Hangar At Wall	Building 41, Basement Mechanical Room	BD-141A	ND
41	DWS	B41-DWS-02	B	TSI	Not Damaged	Domestic Water Mastic At Hangar At Wall	Building 41, Basement Mechanical Room	BD-141A	3-5% Chrysotile
41	DWS	B41-DWS-03	B	TSI	Not Damaged	Domestic Water Mastic At Hangar At Wall	Building 41, Basement Mechanical Room City Water	BD-141A	ND
41	HWR	B41-HWR-03	B	TSI	Not Damaged	Hot Water Return Mastic	Building 41, Basement Mechanical Room City Water	BD-121	3-5% Chrysotile
41	SV5	B41-SV5-01	B	Misc.	Not Damaged	Gray Sheet Vinyl Textured	Building 41, Basement	BD-123	ND
41	JC	B41-JC-26	B	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	BD-103B	ND
41	CT4	B41-CT4-01	B	Misc.	Not Damaged	2'x2' Recessed Grid	Building 41, Basement Ceilings	4D Corridor	ND
41	CT4	B41-CT4-02	B	Misc.	Not Damaged	2'x2' Recessed Grid	Building 41, Basement Ceilings	4D Corridor	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CT4	B41-CT4-03	B	Misc.	Not Damaged	2'x2' Recessed Grid	Building 41, Basement Ceilings	4D Corridor	ND
41	STM	B41-STM-02	4	Misc.	Not Damaged	Stair Tread Black Mastic	Building 41, Stairwells	4th Floor, Stairwell 5	ND
41	FT3	B41-FT3-06	6	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Mottled With Yellow Mastic	Building 41, 6th Floor	6D-151	ND
41	SV1	B41-SV1-02	6	Misc.	Not Damaged	Tan Sheet Vinyl	Building 41, 6th Floor	6D Waiting Area	ND
41	DS2	B41-DS2-02	5	Misc.	Not Damaged	White Duct Insulation Mastic On Air Handler Unit	Building 41, 5th Floor Mechanical Room	5D-122	3-5% Chrysotile
41	RFS	B41-RFS-05	5	Misc.	Not Damaged	Red Fire Stop	Building 41, 5th Floor, Floor & Wall Penetrations	5D-122	ND
41	FP1	B41-FP1-06	2 Interstitial	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, 2-3 Interstitial Space	Floors 2-3 Interstitial Space Column 2	ND
41	FSP	B41-FSP-03	2 Interstitial	Misc.	Not Damaged	Gray Fire Stop Plaster	Building 41, Mechanical Rooms & Interstitial Spaces	Floors 2-3 Interstitial Space Column 2	ND
41	FT8	B41-FT8-01	1	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 41, 1st Floor	1A-100A	ND
41	FT8	B41-FT8-02	1	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 41, 1st Floor	1A-100A	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	FT8	B41-FT8-03	1	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 41, 1st Floor	1A-100B	ND
41	DS2	B41-DS2-03	2	Misc.	Not Damaged	White Duct Insulation Mastic On Air Handler Unit	Building 41, 2nd Floor Mechanical Room	1A-222	ND
41	CT5	B41-CT5-02	2	Misc.	Not Damaged	2'x4' Smooth Ceiling Tile	Building 41, 2nd Floor Ceiling	2A-105	ND
41	CT5	B41-CT5-03	2	Misc.	Not Damaged	2'x4' Smooth Ceiling Tile	Building 41, 2nd Floor Ceiling	2D-156	ND
41	CB1	B41-CB1-01	6	Misc.	Not Damaged	4" Yellow Cove Base Mastic	Building 41, 6th Floor	6A-133A	ND
41	CB1	B41-CB1-02	6	Misc.	Not Damaged	4" Yellow Cove Base Mastic	Building 41, 6th Floor	6A-109A	ND
41	CB1	B41-CB1-03	6	Misc.	Not Damaged	4" Yellow Cove Base Mastic	Building 41, 6th Floor	6A-131A	ND
41	STC	B41-STC-02	EXT.	Misc.	Not Damaged	Tan Exterior Stucco & Plaster	Building 41, Exterior Walls	Front Hospital Entrance	ND
41	STC	B41-STC-03	EXT.	Misc.	Not Damaged	Tan Exterior Stucco & Plaster	Building 41, Exterior Walls	Northwest Exterior Wall	ND
41	HWS	B41-HWS-04	7 Penthouse	TSI	Not Damaged	White Hot Water Supply Mastic	Building 41, Floor 7 Penthouse	Penthouse Mechanical Room	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	JC	B41-JC-27	7 Penthouse	Misc.	Not Damaged	White Joint Compound	Building 41, Walls Throughout	Penthouse Mechanical Room	ND
41	FP1	B41-FP1-07	7 Penthouse	Surfacing	Not Damaged	Spray Applied Fire Proofing	Building 41, Penthouse Structural Beams	Penthouse Mechanical Room	ND
41	DS1	B41-DS1-04	6 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Interstitial Column C9	3%-5% Chrysotile
41	DS1	B41-DS1-05	5A Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Floor 5A Interstitial	3%-5% Chrysotile
41	DS1	B41-DS1-06	4 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Floor 4 Interstitial Column C14	3%-5% Chrysotile
41	DS1	B41-DS1-07	3 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Floor 3 Interstitial	3%-5% Chrysotile
41	DS1	B41-DS1-08	2 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Floor 2 Interstitial	ND
41	DS1	B41-DS1-09	1 Interstitial	Misc.	Not Damaged	White Duct Insulation Mastic	Building 41, Interstitial Spaces	Floor 1 Interstitial	ND
41	DS2	B41-DS2-04	6D-127	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 6	Floor 6D-127	3%-5% Chrysotile
41	DS2	B41-DS2-05	5A-136	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 5	Floor 5A-136	3%-5% Chrysotile
41	HWR	B41-HWR-04	3A-130	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 3	Floor 3A-130	ND
41	HWR	B41-HWR-04A	6D-127	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 6	Floor 6D-127	3%-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	HWR	B41-HWR-06	2C-167 (from riser)	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 2	Floor 2C-167 (from riser)	ND
41	RFS	B41-RFS-01 ID repeat	6 Interstitial Column C9	TSI	Not Damaged	Roof Drain Mastic	Building 41, Floor 6 Interstitial Column C9	Floor 6 Interstitial Column C9	ND
41	RFS	B41-RFS-02 ID repeat	6A Interstitial	TSI	Not Damaged	Roof Drain Mastic	Building 41, Floor 6 Interstitial	Floor 6A Interstitial	ND
41	RFS	B41-RFS-03 ID repeat	5A Interstitial	TSI	Not Damaged	Sewer Drain Mastic	Building 41, Floor 5 Interstitial	Floor 5A Interstitial	3%-5% Chrysotile
41	RFS	B41-RFS-04 ID repeat	3B Interstitial	TSI	Not Damaged	Sewer Drain Mastic	Building 41, Floor 3 Interstitial	Floor 3B Interstitial	2%-4% Chrysotile
41	RFS	B41-RFS-03 ID repeat twice	4C Interstitial	TSI	Not Damaged	Sewer Drain Mastic	Building 41, Floor 4 Interstitial	Floor4C Interstitial	ND
41	DHW	B41-DHW-02	3A-130	TSI	Not Damaged	Domestic Hot Water Pipe Insulation Mastic	Building 41, Floor 3	Floor 3A-130	ND
41	CHW2	B41-CHW2-01	1C-110	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 1	Floor 1C-110	ND
41	CHW2	B41-CHW2-02	1C-110	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 1	Floor 1C-110	ND
41	CHW2	B41-CHW2-03	1C-110	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 1	Floor 1C-110	ND
41	DS3	B41-DS3-01	1C-110	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 1	Floor 1C-110	ND
41	CHWX	B41-CHWX-01	5C-157	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	CHWX	B41-CHWX-02	5C-157	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
41	CHWX	B41-CHWX-03	5C-157	TSI	Not Damaged	Chilled Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	HWX	B41-HWX-01	5C-157	TSI	Not Damaged	Heating Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	HWX	B41-HWX-02	5C-127	TSI	Not Damaged	Heating Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	HWX	B41-HWX-03	5C-127	TSI	Not Damaged	Heating Water Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	STMX	B41-STMX-01	5C-127	TSI	Not Damaged	Steam Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	STMX	B41-STMX-02	5C-127	TSI	Not Damaged	Steam Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	STMX	B41-STMX-03	5C-127	TSI	Not Damaged	Steam Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	DS2X	B41-DS2X-01	5C-127	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	DS2X	B41-DS2X-02	5C-127	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 5	Floor 5C-127	ND
41	DS2X	B41-DS2X-03	5C-127	Misc.	Not Damaged	AHU Insulation Mastic	Building 41, Floor 5	Floor 5C-127	3%-5% Chrysotile
41	DSSX	B41-DSSX-01	5C-127	Misc.	Not Damaged	Metal Duct Seam Mastic	Building 41, Floor 5	Floor 5C-127	ND
41	DSSX	B41-DSSX-02	5C-127	Misc.	Not Damaged	Metal Duct Seam Mastic	Building 41, Floor 5	Floor 5C-127	ND
41	DSSX	B41-DSSX-03	5C-127	Misc.	Not Damaged	Metal Duct Seam Mastic	Building 41, Floor 5	Floor 5C-127	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
42	JC	B42-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 42, Walls Throughout	Generator Room	Non-Detect
42	JC	B42-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 42, Walls Throughout	Switch Room	Non-Detect
42	JC	B42-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 42, Walls Throughout	Switch Room	Non-Detect
42	GEX	B42-GEX-01	1	TSI	Not Damaged	Generator Exhaust Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile
42	GEX	B42-GEX-02	1	TSI	Not Damaged	Generator Exhaust Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile
42	GEX	B42-GEX-03	1	TSI	Not Damaged	Generator Exhaust Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile
42	HW	B42-HW-01	1	TSI	Not Damaged	Heating Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	Non-Detect
42	HW	B42-HW-02	1	TSI	Not Damaged	Heating Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	Non-Detect
42	HW	B42-HW-03	1	TSI	Not Damaged	Heating Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	Non-Detect
42	DW	B42-DW-01	1	TSI	Not Damaged	Domestic Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile
42	DW	B42-DW-02	1	TSI	Not Damaged	Domestic Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile
42	DW	B42-DW-03	1	TSI	Not Damaged	Domestic Water, Insulation & Mastic	Building 42, Generator Room	Generator Room	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
42	STC	B42-STC-01	1	Misc.	Not Damaged	Exterior Tan Stucco & Gray Plaster	Building 43, Exterior Wall	Exterior Wall	Non-Detect
42	STC	B42-STC-02	1	Misc.	Not Damaged	Exterior Tan Stucco & Gray Plaster	Building 43, Exterior Wall	Exterior Wall	Non-Detect
42	STC	B42-STC-03	1	Misc.	Not Damaged	Exterior Tan Stucco & Gray Plaster	Building 43, Exterior Wall	Exterior Wall	Non-Detect
42	CLK	B42-CLK-01	1	Misc.	Not Damaged	Exterior Louver Caulk	Building 43, Exterior Loovers	Exterior Loovers	Non-Detect
42	CLK	B42-CLK-02	1	Misc.	Not Damaged	Exterior Louver Caulk	Building 43, Exterior Loovers	Exterior Loovers	Non-Detect
42	CLK	B42-CLK-03	1	Misc.	Not Damaged	Exterior Louver Caulk	Building 43, Exterior Loovers	Exterior Loovers	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	BFW	B43-BFW-01	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 3	Non-Detect
43	BFW	B43-BFW-02	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 3	3-5% Chrysotile
43	BFW	B43-BFW-03	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 2	3-5% Chrysotile
43	BD	B43-BD-01	1	TSI	Damaged	Boiler Blow Down Line Insulation & Mastic	Building 43, Boilers	Boiler 3	Non-Detect
43	CF	B43-CF-01	1	TSI	Not Damaged	Boiler Chemical Feed Line Insulation & Mastic	Building 43, Boilers	Boiler 3	Non-Detect
43	BFW	B43-BFW-04	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 2	Non-Detect
43	BFW	B43-BFW-05	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 1	3-5% Chrysotile
43	BFW	B43-BFW-06	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers	Boiler 1	Non-Detect
43	BD	B43-BD-02	1	TSI	Not Damaged	Boiler Blow Down Line Insulation & Mastic	Building 43, Boilers	Back Boiler 2	Non-Detect
43	BD	B43-BD-03	1	TSI	Damaged	Boiler Blow Down Line Insulation & Mastic	Building 43, Boilers	Center Boiler 2	3-5% Chrysotile
43	CF	B43-CF-02	1	TSI	Damaged	Boiler Chemical Feed Line Insulation & Mastic	Building 43, Boilers	Boiler 2	Non-Detect
43	BD	B43-BD-04	1	TSI	Damaged	Boiler Blow Down Line Insulation & Mastic	Building 43, Boilers	Back Boiler 1	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	BD	B43-BD-05	1	TSI	Damaged	Boiler Blow Down Line Insulation & Mastic	Building 43, Boilers	Center Boiler 1	Non-Detect
43	CF	B43-CF-03	1	TSI	Damaged	Boiler Chemical Feed Line Insulation & Mastic	Building 43, Boilers	Boiler 1	2-4 % Chrysotile
43	PLC	B43-PLC-01	1	Misc.	Not Damaged	Steam Header Metals Plate Coating	Building 43, Steam Header	Steam Header	2-3% Chrysotile
43	PLC	B43-PLC-02	1	Misc.	Not Damaged	Steam Header Metals Plate Coating	Building 43, Steam Header	Steam Header	Non-Detect
43	PLC	B43-PLC-03	1	Misc.	Not Damaged	Steam Header Metals Plate Coating	Building 43, Steam Header	Steam Header	Non-Detect
43	SHB	B43-SHB-01	1	TSI	Damaged	Steam Header Bleed Off	Building 43, Steam Header	Steam Header	2-4% Chrysotile
43	SH	B43-SH-01	1	TSI	Not Damaged	Steam Header Mastic	Building 43, Steam Header	Steam Header	Non-Detect
43	SH	B43-SH-02	1	TSI	Not Damaged	Steam Header Mastic	Building 43, Steam Header	Steam Header	Non-Detect
43	SH	B43-SH-03	1	TSI	Not Damaged	Steam Header Mastic	Building 43, Steam Header	Steam Header	Non-Detect
43	BFWT	B43-BFWT-01	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers Top Catwalk At Economizer	Boiler 1	3-5% Chrysotile
43	BFWT	B43-BFWT-02	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers Top Catwalk At Economizer	Boiler 2	Non-Detect
43	BFWT	B43-BFWT-03	1	TSI	Not Damaged	Boiler Feed Water Insulation & Mastic	Building 43, Boilers Top Catwalk At Economizer	Boiler 3	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	EPG	B43-EPG-01	1	Misc.	Not Damaged	Boiler Economizer Panel Gasket	Building 43, Boiler Top Catwalk At Economizer	Boiler 1	95 % Chrysotile
43	CON	B43-CON-01	1	TSI	Not Damaged	Condensate Elbow Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Adjacent To Stairs	3-5% Chrysotile
43	CTNK	B43-CTNK-01	1	TSI	Not Damaged	Condensate Tank Insulation & Mastic	Building 43, Condensate Tank Main Level	Condensate Tank Main Level	Non-Detect
43	CON	B43-CON-02	1	TSI	Not Damaged	Condensate Fitting Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Back Wall	Non-Detect
43	CON	B43-CON-03	1	TSI	Not Damaged	Condensate Fitting Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Back Wall	Non-Detect
43	DW	B43-DW-01	1	TSI	Not Damaged	Domestic Water Cold Fitting Insulation and Mastic	Building 43, Domestic Water Cold Line	Domestic Water Line Cold, Near Control Room	Non-Detect
43	DRN	B43-DRN-01	1	TSI	Not Damaged	Drain Line Insulation & Mastic	Building 43, Drain Line Back Wall Adj. To Condensate Tank	Back Wall Adj. To Condensate Tank	Non-Detect
43	DRN	B43-DRN-02	1	TSI	Not Damaged	Drain Line Insulation & Mastic	Building 43, Drain Line Back Wall Adj. To Condensate Tank	Back Wall Adj. To Condensate Tank	Non-Detect
43	DRN	B43-DRN-03	1	TSI	Not Damaged	Drain Line Insulation & Mastic	Building 43, Drain Line Back Wall Adj. To Condensate Tank	Back Wall Adj. To Condensate Tank	Non-Detect
43	CTNK	B43-CTNK-02	B	TSI	Not Damaged	Condensate Tank Insulation & Mastic	Building 43, Basement Condensate Tank	Basement Condensate Tank	3-5% Chrysotile
43	HW	B43-HW-01	B	TSI	Not Damaged	Hot Water Line Insulation & Mastic	Building 43, Basement Hot Water Lines	Basement Hot Water Lines	Non-Detect
43	HW	B43-HW-02	B	TSI	Not Damaged	Hot Water Line Insulation & Mastic	Building 43, Basement Hot Water Lines	Basement Hot Water Lines	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	CTNK	B43-CTNK-03	Mez.	TSI	Not Damaged	Condensate Tank Insulation & Mastic	Building 43, Mezzanine Condensate Tank	Mezzanine Condensate Tank	Non-Detect
43	DRN	B43-DRN-04	Mez.	TSI	Damaged	Drain Line Insulation & Mastic	Building 43, Mezzanine Drian Line	Mezzanine Drain Line	Non-Detect
43	LPS	B43-LPS-01	Mez.	TSI	Not Damaged	Low Pressure Steam Insulation & Mastic	Building 43, Mezzanine Low Pressure Steam Line	Mezzanine Low Pressure Steam Line	3-5% Chrysotile
43	MPS	B43-MPS-01	Mez.	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 43, MezzanineMedium Pressure Steam Line	Mezzanine Medium Pressure Steam Line	3-5% Chrysotile
43	MPS	B43-MPS-02	Mez.	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 43, MezzanineMedium Pressure Steam Line	Mezzanine Medium Pressure Steam Line	3-5% Chrysotile
43	MPS	B43-MPS-03	Mez.	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 43, MezzanineMedium Pressure Steam Line	Mezzanine Medium Pressure Steam Line	Non-Detect
43	LPS	B43-LPS-02	Mez.	TSI	Not Damaged	Low Pressure Steam Insulation & Mastic	Building 43, Mezzanine Low Pressure Steam Line	Mezzanine Low Pressure Steam Line	3-5% Chrysotile
43	LPS	B43-LPS-03	Mez.	TSI	Not Damaged	Low Pressure Steam Insulation & Mastic	Building 43, Mezzanine Low Pressure Steam Line	Mezzanine Low Pressure Steam Line	3-5% Chrysotile
43	CHW	B43-CHW-01	1	TSI	Not Damaged	Chilled Water Piping Insulation & Mastic	Building 43, Chilled Water Pump Room	Chilled Water Pump 6	Non-Detect
43	CHW	B43-CHW-02	1	TSI	Not Damaged	Chilled Water Piping Insulation & Mastic	Building 43, Chilled Water Pump Room	Chilled Water Pump 6	Non-Detect
43	CHW	B43-CHW-03	1	TSI	Not Damaged	Chilled Water Piping Insulation & Mastic	Building 43, Chilled Water Pump Room	Chilled Water Pump 7	Non-Detect
43	CHEW	B43-CHEW-01	1	TSI	Not Damaged	Chilled Water Chemical Supply Lines Insulation & Mastic	Building 43, Chilled Water Pump Room Chemical Supply Lines	Chilled Water Pump Room Chemical Supply Lines	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	CHEW	B43-CHEW-02	1	TSI	Not Damaged	Chilled Water Chemical Supply Lines Insulation & Mastic	Building 43, Chilled Water Pump Room Chemical Supply Lines	Chilled Water Pump Room Chemical Supply Lines	Non-Detect
43	CHEW	B43-CHEW-03	1	TSI	Not Damaged	Chilled Water Chemical Supply Lines Insulation & Mastic	Building 43, Chilled Water Pump Room Chemical Supply Lines	Chilled Water Pump Room Chemical Supply Lines	Non-Detect
43	JC	B43-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 43, Walls Throughout	Chilled Water Pump Room	Non-Detect
43	JC	B43-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 43, Walls Throughout	Boiler Room Column	Non-Detect
43	JC	B43-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 43, Walls Throughout	Boiler Room Column	Non-Detect
43	CT1	B43-CT1-001	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 43, Control Room Office Ceiling	Control Room Office	Non-Detect
43	CT1	B43-CT1-002	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 43, Control Room Office Ceiling	Control Room Office	Non-Detect
43	CT1	B43-CT1-003	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 43, Control Room Office Ceiling	Control Room Office	Non-Detect
43	FT1	B43-FT1-01	1	Misc.	Not Damaged	12"x12" Beige Mottled Floor Tile & Yellow Mastic	Building 43, Control Room Office	Control Room Office	Non-Detect
43	FT1	B43-FT1-02	1	Misc.	Not Damaged	12"x12" Beige Mottled Floor Tile & Yellow Mastic	Building 43, Control Room Office	Control Room Office	Non-Detect
43	FT1	B43-FT1-03	1	Misc.	Not Damaged	12"x12" Beige Mottled Floor Tile & Yellow Mastic	Building 43, Control Room Office	Control Room Office	Non-Detect
43	STC	B43-STC-01	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43, Exterior Walls	Exterior Wall	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	STC	B43-STC-02	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43, Exterior Walls	Exterior Wall	Non-Detect
43	STC	B43-STC-03	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43, Exterior Walls	Exterior Wall	Non-Detect
43	FT1	B43-FT1-04	2	Misc.	Not Damaged	12"x12" Beige Mottled Floor Tile & Yellow Mastic	Building 43, Second Floor Control Room Office	Second Floor Control Room Office	Non-Detect
43	FT1	B43-FT1-05	2	Misc.	Not Damaged	12"x12" Beige Mottled Floor Tile & Yellow Mastic	Building 43, Second Floor Control Room Office	Second Floor Control Room Office	Non-Detect
43	JC	B43-JC-04	1	Misc.	Not Damaged	White Joint Compound	Building 43, Second Floor Control Room Office	Second Floor Control Room Office	Non-Detect
43	JC	B43-JC-05	1	Misc.	Not Damaged	White Joint Compound	Building 43, Second Floor Control Room Office	Second Floor Control Room Office	Non-Detect
43	VNT	B43-VNT-01	1	TSI	Not Damaged	White Vent Piping Insulation & Mastic	Building 43, Vent Lines	Vent Lines	3 - 5% Chrysotile
43	VNT	B43-VNT-02	1	TSI	Not Damaged	White Vent Piping Insulation & Mastic	Building 43, Vent Lines	Vent Lines	3 - 5% Chrysotile
43	VNT	B43-VNT-03	Mez.	TSI	Not Damaged	White Vent Piping Insulation & Mastic	Building 43, Vent Lines	Vent Lines	3 - 5% Chrysotile
43	VNT	B43-VNT-04	Mez.	TSI	Not Damaged	White Vent Piping Insulation & Mastic	Building 43, Vent Lines	Vent Lines	3 - 5% Chrysotile
43	BP	B43-BP-01	Mez.	TSI	Not Damaged	White Bypass Piping Insulation & Mastic	Building 43, Bypass Line	Mezz. Bypass Line	Non-Detect
43	BP	B43-BP-02	Mez.	TSI	Not Damaged	White Bypass Piping Insulation & Mastic	Building 43, Bypass Line	Mezz. Bypass Line	Non-Detect
43	BP	B43-BP-03	Mez.	TSI	Not Damaged	White Bypass Piping Insulation & Mastic	Building 43, Bypass Line	Mezz. Bypass Line	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43	CON	B43-CON-03	1	TSI	Damaged	White Condensate Elbow Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Adjacent To Stairs	Non-Detect
43	CON	B43-CON-04	1	TSI	Damaged	White Condensate Elbow Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Adjacent To Stairs	3-5% Chrysotile
43	CON	B43-CON-05	1	TSI	Damaged	White Condensate Elbow Insulation & Mastic	Building 43, Condensate Lines	Condensate Line Adjacent To Stairs	3-5% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
43A	PS	B43A-PS-01	1	TSI	Not Damaged	White Pipe Mastic Mastic	Building 43A, Pipe Insulation	Pipe Insulation	Non-Detect
43A	PS	B43A-PS-02	1	TSI	Not Damaged	White Pipe Mastic Mastic	Building 43A, Pipe Insulation	Pipe Insulation	Non-Detect
43A	PS	B43A-PS-03	1	TSI	Not Damaged	White Pipe Mastic Mastic	Building 43A, Pipe Insulation	Pipe Insulation	Non-Detect
43A	STC	B43A-STC-04	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43A, Exterior Wall Stucco	Exterior Wall	Non-Detect
43A	STC	B43A-STC-05	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43A, Exterior Wall Stucco	Exterior Wall	Non-Detect
43A	STC	B43A-STC-06	1	Misc.	Not Damaged	Stucco & Gray Plaster	Building 43A, Exterior Wall Stucco	Exterior Wall	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	FT1	B45-FT1-01	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Specks & Yellow Mastic	Building 45, Hallway Floors	Hallway Near Pool	Non-Detect
45	FT2	B45-FT2-01	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Near Pool	Non-Detect
45	FT1A	B45-FT1A-01	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Confrence Room 1083	Non-Detect
45	FT2A	B45-FT2A-01	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Confrence Room 1083	Non-Detect
45	JC	B45-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 45, Walls Throughout	Confrence Room 1083	Non-Detect
45	FT1A	B45-FT1A-02	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Room 1050	Non-Detect
45	FT2A	B45-FT2A-02	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1050	Non-Detect
45	FT2	B45-FT2-02	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Outside Room 1050	Non-Detect
45	FT3	B45-FT3-01	1	Misc.	Not Damaged	12"x12" Gray, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1041	Non-Detect
45	JC	B45-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 45, Walls Throughout	Room 1041	Non-Detect
45	CT1	B45-CT1-01	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 45, Ceiling	Room 1038	Non-Detect
45	FT1A	B45-FT1A-03	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Room 1032	Non-Detect
45	FT2A	B45-FT2A-03	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1032	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	CB1	B45-CB1-01	1	Misc.	Not Damaged	Green Cove Base & Yellow Mastic	Building 45, Cove Base	Room 1032	Non-Detect
45	FT1	B45-FT1-02	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Outside Room 1032	Non-Detect
45	JC	B45-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 45, Walls Throughout	Room 1032	Non-Detect
45	FT1A	B45-FT1A-04	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect
45	FT1A	B45-FT1A-05	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect
45	FT2A	B45-FT2A-04	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect
45	FT2A	B45-FT2A-05	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect
45	FT3	B45-FT3-02	1	Misc.	Not Damaged	12"x12" Gray, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1019	Non-Detect
45	FT2	B45-FT2-03	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Corridor Outside Room 1009	Non-Detect
45	FT1	B45-FT1-03	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Specks & Yellow Mastic	Building 45, Hallway Floors	Hallway Corridor Outside Room 1009	Non-Detect
45	FT1	B45-FT1-04	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Specks & Yellow Mastic	Building 45, Hallway Floors	Hallway Corridor Outside Room 1060	Non-Detect
45	FT2	B45-FT2-04	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Corridor Outside Room 1060	Non-Detect
45	CB1	B45-CB1-02	1	Misc.	Not Damaged	Green Cove Base & Yellow Mastic	Building 45, Cove Base	Hallway Corridor Outside Room 1070	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	CB1	B45-CB1-03	1	Misc.	Not Damaged	Green Cove Base & Yellow Mastic	Building 45, Cove Base	Hallway Corridor Outside Room 1070	Non-Detect
45	CT1	B45-CT1-02	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 45, Ceiling	Hallway Corridor Outside Pool	Non-Detect
45	CT1	B45-CT1-03	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 45, Ceiling	Hallway Corridor Outside Room 1090	Non-Detect
45	JC	B45-JC-04	1	Misc.	Not Damaged	White Joint Compound	Building 45, Walls Throughout	Alcove Near 1091	Non-Detect
45	FT1	B45-FT1-05	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Specks & Yellow Mastic	Building 45, Hallway Floors	Hallway Corridor Outside Room 1091	Non-Detect
45	FT2	B45-FT2-05	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building 45, Hallway Boarder	Hallway Corridor West Entrance	Non-Detect
45	CT1	B45-CT1-04	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 45, Ceiling	Hallway Corridor Outside Room 1070	Non-Detect
45	CT1	B45-CT1-05	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile	Building 45, Ceiling	Hallway Corridor Outside Room 1059	Non-Detect
45	MPS	B45-MPS-01	1	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	MPS	B45-MPS-02	1	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	MPS	B45-MPS-03	1	TSI	Not Damaged	Medium Pressure Steam Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	CON	B45-CON-01	1	TSI	Not Damaged	Condensate Lines Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	CON	B45-CON-02	1	TSI	Not Damaged	Condensate Lines Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	CON	B45-CON-03	1	TSI	Not Damaged	Condensate Lines Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	RDS	B45-RDS-01	1	Misc.	Not Damaged	Red Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	DM1	B45-DM1-01	1	Misc.	Not Damaged	White Duct Insulation Mastic	Building 45, Metal Ducts	Mechanical Room 1067	Non-Detect
45	WDS	B45-WDS-01	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1067	Non-Detect
45	RFS	B45-RFS-01	1	Misc.	Not Damaged	Red Fire Stop	Building 45, Utility Penetrations	Mechanical Room 1067	Non-Detect
45	DM1	B45-DM1-02	1	Misc.	Not Damaged	White Duct Insulation Mastic	Building 45, Metal Ducts	Hallway Corridor Outside Room 1078	Non-Detect
45	DM1	B45-DM1-03	1	Misc.	Not Damaged	White Duct Insulation Mastic	Building 45, Metal Ducts	Hallway Corridor Outside Room 1090	Non-Detect
45	FT3	B45-FT3-03	1	Misc.	Not Damaged	12"x12" Gray, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1086	Non-Detect
45	JC	B45-JC-05	1	Misc.	Not Damaged	White Joint Compound	Building 45, Walls Throughout	Room 1086	Non-Detect
45	RDS	B45-RDS-02	1	Misc.	Not Damaged	Red Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	RDS	B45-RDS-03	1	Misc.	Not Damaged	Red Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	GDS	B45-GDS-01	1	Misc.	Not Damaged	Gray Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	HW	B45-HW-01	1	TSI	Not Damaged	Hot Water Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	HW	B45-HW-02	1	TSI	Not Damaged	Hot Water Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	HW	B45-HW-03	1	TSI	Not Damaged	Hot Water Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	CW	B45-CW-01	1	TSI	Not Damaged	Chilled Water System Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	CW	B45-CW-02	1	TSI	Not Damaged	Chilled Water System Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	CW	B45-CW-03	1	TSI	Not Damaged	Chilled Water System Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	WDS	B45-WDS-01	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	WDS	B45-WDS-02	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	HW	B45-HW-04	1	TSI	Not Damaged	Hot Water Insulation & Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	WDS	B45-WDS-03	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building 45, Mechanical Rooms	Mechanical Room 1031	Non-Detect
45	STC	B45-STC-01	1	Misc.	Not Damaged	Tan Stucco & Gray Plaster	Building 45, Exterior Stucco	Exterior Wall	Non-Detect
45	STC	B45-STC-02	1	Misc.	Not Damaged	Tan Stucco & Gray Plaster	Building 45, Exterior Stucco	Exterior Wall	Non-Detect
45	STC	B45-STC-03	1	Misc.	Not Damaged	Tan Stucco & Gray Plaster	Building 45, Exterior Stucco	Exterior Wall	Non-Detect
45	FT1A	B45-FT1A-05	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Inclusions & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect
45	FT2A	B45-FT2A-05	1	Misc.	Not Damaged	12"x12" Light Green, Mottled Floor Tile & Yellow Mastic	Building 45, Rooms	Room 1030	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
45	CB1	B45-CB1-03	1	Misc.	Not Damaged	Green Cove Base & Yellow Mastic	Building 45, Cove Base	Hallway Corridor Outside Room 1070	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
46	CT1	B46-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs, Brown Back	Building 46, Ceilings	Foyeur	Non-Detect
46	CT1	B46-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs, Brown Back	Building 46, Ceilings	Room 110	Non-Detect
46	CT1	B46-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs, Brown Back	Building 46, Ceilings	Room 110	Non-Detect
46	CT2	B46-CT2-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Star Dots	Building 46, Ceilings Warehouse Office, Restrooms & Hallway	Mens Restroom	Non-Detect
46	CT2	B46-CT2-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Star Dots	Building 46, Ceilings Warehouse Office, Restrooms & Hallway	Warehouse Office	Non-Detect
46	CT2	B46-CT2-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Star Dots	Building 46, Ceilings Warehouse Office, Restrooms & Hallway	Hallway	Non-Detect
46	GDS	B46-GDS-01	1	Misc.	Not Damaged	Gray Duct Mastic Metal Duct Seams	Building 46, Above Restroom Ceilings	Above Restroom Ceiling	Non-Detect
46	GDS	B46-GDS-02	1	Misc.	Not Damaged	Gray Duct Mastic Metal Duct Seams	Building 46, Above Restroom Ceilings	Above Restroom Ceiling	Non-Detect
46	GDS	B46-GDS-03	1	Misc.	Not Damaged	Gray Duct Mastic Metal Duct Seams	Building 46, Above Restroom Ceilings	Above Restroom Ceiling	Non-Detect
46	CT3	B46-CT3-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specks	Building 46, Office & Mail Room	Large Office	Non-Detect
46	CT3	B46-CT3-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specks	Building 46, Office & Mail Room	Large Office	Non-Detect
46	CT3	B46-CT3-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specks	Building 46, Office & Mail Room	Mail Room	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
46	JC	B46-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 46, Walls Throughout	Mens Restroom	Non-Detect
46	JC	B46-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 46, Walls Throughout	Warehouse Office	Non-Detect
46	JC	B46-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 46, Walls Throughout	Room 110	Non-Detect
46	FT1	B46-FT1-01	1	Misc.	Not Damaged	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Room 110	5-7% Chrysotile Mastic
46	FT1	B46-FT1-02	1	Misc.	Not Damaged	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Room 105A Warehouse Office	5-7% Chrysotile Mastic
46	FT1	B46-FT1-03	1	Misc.	Not Damaged	12"x12" White Floor Tile & Black Mastic	Building 46, Large Office, Room 110 & Warehouse Office	Room 105A Warehouse Office	5-7% Chrysotile Mastic
46	FT2	B46-FT2-01	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Mail Room	Mail Room	Non-Detect
46	FT2	B46-FT2-02	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Mail Room	Mail Room	Non-Detect
46	FT2	B46-FT2-03	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Mail Room	Mail Room	Non-Detect
46	RBM	B46-RBM-01	1	Misc.	Not Damaged	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Large Office	6-8% Chrysotile Mastic
46	RBM	B46-RBM-02	1	Misc.	Not Damaged	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Large Office	6-8% Chrysotile Mastic

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
46	RBM	B46-RBM-03	1	Misc.	Not Damaged	Residual Black Mastic Beneath Carpet Squares In Large Office Area	Large Office Area	Large Office	6-8% Chrysotile Mastic

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
49	FT1	B49-FT1-01	1	Misc.	Not Damaged	12"x12" Cranberry Floor Tile & Yellow Mastic	Building 49, Floor	Room 108	Non-Detect
49	FT1	B49-FT1-02	1	Misc.	Not Damaged	12"x12" Cranberry Floor Tile & Yellow Mastic	Building 49, Floor	Room 109	Non-Detect
49A	FT1	B49-FT1-03	Mezz.	Misc.	Not Damaged	12"x12" Cranberry Floor Tile & Yellow Mastic	Building 49, Floor	Mezzanine Mechanical Room	Non-Detect
49	FT2	B49-FT2-01	1	Misc.	Not Damaged	12"x12" Gray Floor Tile & Yellow Mastic	Building 49, Floor	Lobby	Non-Detect
49	FT2	B49-FT2-02	1	Misc.	Not Damaged	12"x12" Gray Floor Tile & Yellow Mastic	Building 49, Floor	Room 121	Non-Detect
49	FT2	B49-FT2-03	1	Misc.	Not Damaged	12"x12" Gray Floor Tile & Yellow Mastic	Building 49, Floor	Mammogram Doorway	Non-Detect
49	CT1	B49-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 2'x2' Recessed Pattern	Building 49, Ceilings	Room 112	Non-Detect
49	CT1	B49-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 2'x2' Recessed Pattern	Building 49, Ceilings	Room 112	Non-Detect
49	CT1	B49-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 2'x2' Recessed Pattern	Building 49, Ceilings	Corridor	Non-Detect
49	CT2	B49-CT2-01	1	Misc.	Not Damaged	2'x2' White Ceiling Tile, Specs	Building 49, Ceilings	Room 124	Non-Detect
49	CT2	B49-CT2-02	1	Misc.	Not Damaged	2'x2' White Ceiling Tile, Specs	Building 49, Ceilings	Room 131	Non-Detect
49	CT2	B49-CT2-03	1	Misc.	Not Damaged	2'x2' White Ceiling Tile, Specs	Building 49, Ceilings	Room 108	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
49	CT3	B49-CT3-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 1'x1' Recessed Pattern	Building 49, Lobby Ceiling	Lobby	Non-Detect
49	CT3	B49-CT3-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 1'x1' Recessed Pattern	Building 49, Lobby Ceiling	Lobby	Non-Detect
49	CT3	B49-CT3-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile With 1'x1' Recessed Pattern	Building 49, Lobby Ceiling	Lobby	Non-Detect
49	JC	B49-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 49, Walls Throughout	Mezzanine Stairwell	Non-Detect
49	JC	B49-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 49, Walls Throughout	Corridor	Non-Detect
49	JC	B49-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 49, Walls Throughout	Room 112	Non-Detect
49	NDT	B49-NDT-01	1	TSI	Not Damaged	No Drip Tape, Black	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49	CHW	B49-CHW-01	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49	CHW	B49-CHW-02	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49	CHW	B49-CHW-03	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49	HW1	B49-HW1-01	1	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
49	HW1	B49-HW1-02	1	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49	HW1	B49-HW1-03	1	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, 1st Floor Mechanical Room	Room 109	Non-Detect
49A	HRS	B49-HPS-01	Mezz.	TSI	Not Damaged	High Pressure Steam Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	HRS	B49-HPS-02	Mezz.	TSI	Not Damaged	High Pressure Steam Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	HRS	B49-HPS-03	Mezz.	TSI	Not Damaged	High Pressure Steam Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	CON	B49-CON-01	Mezz.	TSI	Not Damaged	Condensate Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	CON	B49-CON-02	Mezz.	TSI	Not Damaged	Condensate Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	CON	B49-CON-03	Mezz.	TSI	Not Damaged	Condensate Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	DM	B49-DM-01	Mezz.	TSI	Not Damaged	White Duct Insulation Mastic	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	DM	B49-DM-02	Mezz.	TSI	Not Damaged	White Duct Insulation Mastic	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	DM	B49-DM-03	Mezz.	TSI	Not Damaged	White Duct Insulation Mastic	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
49A	HW2	B49-HW2-01	Mezz.	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	HW2	B49-HW2-02	Mezz.	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	HW2	B49-HW2-03	Mezz.	TSI	Not Damaged	Hot Water Insulation & Mastic, White	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	RDS	B49-RDS-01	Mezz.	Misc.	Not Damaged	Red Duct Mastic, Metal Duct Seams	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	RDS	B49-RDS-02	Mezz.	Misc.	Not Damaged	Red Duct Mastic, Metal Duct Seams	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect
49A	RDS	B49-RDS-03	Mezz.	Misc.	Not Damaged	Red Duct Mastic, Metal Duct Seams	Building 49, Mezzanine Mechanical Room	Mezzanie Mechanical Room	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos	Result
50	CT1	B50-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Cuts & Dots	Building 50, Ceiling	Room 107	Non-Detect	ND
50	CT1	B50-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Cuts & Dots	Building 50, Ceiling	Room 106	Non-Detect	ND
50	CT1	B50-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Cuts & Dots	Building 50, Ceiling	Room 114	Non-Detect	ND
50	FT1	B50-FT1-01	1	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Heavy Mottled	Building 50, Floors	Room 116	Non-Detect	ND
50	FT1	B50-FT1-02	1	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Heavy Mottled	Building 50, Floors	Room 114	Non-Detect	ND
50	FT1	B50-FT1-03	1	Misc.	Not Damaged	12"x12" Multi-Colored Floor Tile, Heavy Mottled	Building 50, Floors	Room 117	Non-Detect	ND
50	JC	B50-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 50, Walls Throughout	Room 117	Non-Detect	ND
50	JC	B50-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 50, Walls Throughout	Room 117	Non-Detect	ND
50	JC	B50-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 50, Walls Throughout	Room 102	Non-Detect	ND
50	WV	B50-WV-01	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 50, Floor	Looby	Non-Detect	ND
50	WV	B50-WV-02	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 50, Floor	Room 102	Non-Detect	ND
50	WV	B50-WV-03	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 50, Floor	Room 102	Non-Detect	ND

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos	Result
50	FT2	B50-FT2-01	1	Misc.	Not Damaged	12"x12" Mauve Floor Tile & Yellow Mastic	Building 50, Floor Janitor Closet	Room 111, Janitor Closet	Non-Detect	ND
50	FT2	B50-FT2-02	1	Misc.	Not Damaged	12"x12" Mauve Floor Tile & Yellow Mastic	Building 50, Floor Janitor Closet	Room 111, Janitor Closet	Non-Detect	
50	FT2	B50-FT2-03	1	Misc.	Not Damaged	12"x12" Mauve Floor Tile & Yellow Mastic	Building 50, Floor Janitor Closet	Room 111, Janitor Closet	Non-Detect	

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
52	FT1	B52-FT1-01	1	Misc.	Not Damaged	12"x12" Brown Floor Tile & Yellow Mastic	Building 52, Floor	Room 121	Non-Detect
52	FT1	B52-FT1-02	1	Misc.	Not Damaged	12"x12" Brown Floor Tile & Yellow Mastic	Building 52, Floor	Room 121	Non-Detect
52	FT1	B52-FT1-03	1	Misc.	Not Damaged	12"x12" Brown Floor Tile & Yellow Mastic	Building 52, Floor	Room 121	Non-Detect
52	CT1	B52-CT1-01	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building 52, Ceiling	Hallway Outside Room 115	Non-Detect
52	CT1	B52-CT1-02	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building 52, Ceiling	Room 114	Non-Detect
52	CT1	B52-CT1-03	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building 52, Ceiling	Hallway Outside Room 132	Non-Detect
52	JC	B52-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 52, Walls Throughout	Room 121	Non-Detect
52	JC	B52-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 52, Walls Throughout	Hallway Outside Room 111	Non-Detect
52	JC	B52-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 52, Walls Throughout	Hallway Outside Room 132	Non-Detect
52	JC	B52-JC-04	1	Misc.	Not Damaged	White Joint Compound	Building 52, Walls Throughout	Hallway Outside Room 103	Non-Detect
52	JC	B52-JC-05	1	Misc.	Not Damaged	White Joint Compound	Building 52, Walls Throughout	Hallway Outside Room 135	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
52	HW	B52-HW-01	1	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 52, Above Suspended Ceiling, Pipe Chases & Mechanical	Hallway Outside Room 107	Non-Detect
52	HW	B52-HW-02	1	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 52, Above Suspended Ceiling, Pipe Chases & Mechanical	Hallway Outside Room 121	Non-Detect
52	HW	B52-HW-03	1	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 52, Above Suspended Ceiling, Pipe Chases & Mechanical	Hallway Outside Room 130	Non-Detect
52	RFS	B52-RFS-01	1	Misc.	Not Damaged	Red Fire Stop	Building 52, Penetrations	Room 114	Non-Detect
52	RFS	B52-RFS-02	1	Misc.	Not Damaged	Red Fire Stop	Building 52, Penetrations	Hallway Outside Room 132	Non-Detect
52	RFS	B52-RFS-03	1	Misc.	Not Damaged	Red Fire Stop	Building 52, Penetrations	Mechanical Room 113	Non-Detect
52	WV1	B52-WV1-01	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 52, Floor	Room 114	Non-Detect
52	WV1	B52-WV1-02	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 52, Floor	Hallway Outside Room 132	Non-Detect
52	WV1	B52-WV1-03	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building 52, Floor	Mechanical Room 113	Non-Detect
52	CHW	B52-CHW-01	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 52, Chilled Water Lines	Mechanical Room 113	Non-Detect
52	CHW	B52-CHW-02	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 52, Chilled Water Lines	Mechanical Room 113	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
52	CHW	B52-CHW-03	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 52, Chilled Water Lines	Mechanical Room 113	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
53	DW	B53-DW-01	2	TSI	Not Damaged	Domestic Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	Mens Restroom Pipe Chase	Non-Detect
53	DW	B53-DW-02	2	TSI	Not Damaged	Domestic Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	Mens Restroom Pipe Chase	Non-Detect
53	DW	B53-DW-03	1	TSI	Not Damaged	Domestic Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	Mens Restroom Pipe Chase	Non-Detect
53	HW	B53-HW-01	2	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	2nd Floor Hallway Outside Room 050	Non-Detect
53	HW	B53-HW-02	2	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	2nd Floor Hallway Outside Room 068	Non-Detect
53	HW	B53-HW-03	1	TSI	Not Damaged	Heating Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	1st Floor Hallway Outside Room 021	Non-Detect
53	CHW	B53-CHW-01	2	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	2nd Floor Hallway Outside Room 050	Non-Detect
53	CHW	B53-CHW-02	2	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	2nd Floor Hallway Outside Room 068	Non-Detect
53	CHW	B53-CHW-03	1	TSI	Not Damaged	Chilled Water Insulation & Mastic, White	Building 53, Above Suspended Ceilings and Pipe Chases	1st Floor Hallway Outside Room 021	Non-Detect
53	CT	B53-CT-01	2	Misc.	Not Damaged	2'x2' Ceiling Tile, White	Building 53, Ceilings	2nd Floor Hallway Outside Confrence Room 078	Non-Detect
53	CT	B53-CT-02	2	Misc.	Not Damaged	2'x2' Ceiling Tile, White	Building 53, Ceilings	2nd Floor Hallway Reception Lobby	Non-Detect
53	CT	B53-CT-03	1	Misc.	Not Damaged	2'x2' Ceiling Tile, White	Building 53, Ceilings	1st Floor Hallway Reception Lobby	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
53	RFS	B53-RFS-01	2	Misc.	Not Damaged	Red Fire Stop	Building 53, Penetrations	2nd Floor Hallway Outside Room 078	Non-Detect
53	RFS	B53-RFS-02	2	Misc.	Not Damaged	Red Fire Stop	Building 53, Penetrations	2nd Floor Hallway Outside Room 078	Non-Detect
53	RFS	B53-RFS-03	1	Misc.	Not Damaged	Red Fire Stop	Building 53, Penetrations	1st Floor Hallway Outside Room 052	Non-Detect
53	FT1	B53-FT1-01	2	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 53, Hallways	2nd Floor Outside HAC Room 077	Non-Detect
53	FT1	B53-FT1-02	2	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 53, Hallways	2nd Floor Outside HAC Room 077	Non-Detect
53	FT1	B53-FT1-03	1	Misc.	Not Damaged	12"x12" Green Floor Tile & Yellow Mastic	Building 53, Hallways	1st Floor Outside HAC Room 031	Non-Detect
53	JC	B53-JC-01	2	Misc.	Not Damaged	White Joint Compound	Building 53, Walls Throughout	2nd Floor Confrence Room 078	Non-Detect
53	JC	B53-JC-02	2	Misc.	Not Damaged	White Joint Compound	Building 53, Walls Throughout	2nd Floor Lobby	Non-Detect
53	JC	B53-JC-03	2	Misc.	Not Damaged	White Joint Compound	Building 53, Walls Throughout	2nd Floor South Stairwell	Non-Detect
53	JC	B53-JC-04	1	Misc.	Not Damaged	White Joint Compound	Building 53, Walls Throughout	1st Floor Room 002	Non-Detect
53	JC	B53-JC-05	1	Misc.	Not Damaged	White Joint Compound	Building 53, Walls Throughout	1st Floor Lobby	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
53	WV1	B53-WV1-01	2	Misc.	Not Damaged	Faux Wood Vinyl Strips	Building 53, Floors	2nd Floor Confrence Room 078	Non-Detect
53	WV1	B53-WV1-02	2	Misc.	Not Damaged	Faux Wood Vinyl Strips	Building 53, Floors	2nd Floor Reception Lobby	Non-Detect
53	WV1	B53-WV1-03	1	Misc.	Not Damaged	Faux Wood Vinyl Strips	Building 53, Floors	1st Floor Room 026	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
54	FT1	B54-FT1-01	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 54, Floor	Mechanical Room 204	Non-Detect
54	FT1	B54-FT1-02	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 54, Floor	Hallway Outside Room 216	Non-Detect
54	FT1	B54-FT1-03	1	Misc.	Not Damaged	12"x12" Beige Floor Tile, Mottled & Yellow Mastic	Building 54, Floor	Room 208, Bathroom	Non-Detect
54	CT1	B54-CT1-01	1	Misc.	Not Damaged	2'x4' Ceiling Tile White, Specs	Building 54, Ceiling	Lobby, Room 200	Non-Detect
54	CT1	B54-CT1-02	1	Misc.	Not Damaged	2'x4' Ceiling Tile White, Specs	Building 54, Ceiling	Hallway Outside Room 212	Non-Detect
54	CT1	B54-CT1-03	1	Misc.	Not Damaged	2'x4' Ceiling Tile White, Specs	Building 54, Ceiling	Office 205	Non-Detect
54	FS	B54-FS-01	1	Misc.	Not Damaged	Yellow & Pink Fire Stop	Building 54, Penetrations	Mechanical Room 204	Non-Detect
54	FS	B54-FS-02	1	Misc.	Not Damaged	Yellow & Pink Fire Stop	Building 54, Penetrations	Mechanical Room 204	Non-Detect
54	FS	B54-FS-03	1	Misc.	Not Damaged	Yellow & Pink Fire Stop	Building 54, Penetrations	Mechanical Room 204	Non-Detect
54	CPM	B54-CPM-01	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 54, Rooms	Office 205	Non-Detect
54	CPM	B54-CPM-02	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 54, Rooms	Room 211	Non-Detect
54	CPM	B54-CPM-03	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 54, Rooms	Room 215	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
55	FT1	B55-FT1-01	1	Misc.	Not Damaged	12"x12" White Floor Tile, Gray Smudges & Yellow Mastic	Building 55, Floor	Mechanical Room 101	Non-Detect
55	FT1	B55-FT1-02	1	Misc.	Not Damaged	12"x12" White Floor Tile, Gray Smudges & Yellow Mastic	Building 55, Floor	Room 100, Lounge	Non-Detect
55	FT1	B55-FT1-03	1	Misc.	Not Damaged	12"x12" White Floor Tile, Gray Smudges & Yellow Mastic	Building 55, Floor	Room 110, Restroom	Non-Detect
55	CT1	B55-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 55, Ceiling	Room 100, Lounge	Non-Detect
55	CT1	B55-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 55, Ceiling	Room 100, Lounge	Non-Detect
55	CT1	B55-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 55, Ceiling	Hallway Outside Room 112	Non-Detect
55	RFS	B55-RFS-01	1	Misc.	Not Damaged	Red Fire Stop	Building 55, Penetrations	Mechanical Room 101	Non-Detect
55	RFS	B55-RFS-02	1	Misc.	Not Damaged	Red Fire Stop	Building 55, Penetrations	Mechanical Room 101	Non-Detect
55	RFS	B55-RFS-03	1	Misc.	Not Damaged	Red Fire Stop	Building 55, Penetrations	Mechanical Room 101	Non-Detect
55	CPM	B55-CPM-01	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 55, Caprets	Room 108	Non-Detect
55	CPM	B55-CPM-02	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 55, Caprets	Room 113	Non-Detect
55	CPM	B55-CPM-03	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 55, Caprets	Room 106	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
56	FT1	B56-FT1-01	1	Misc.	Not Damaged	White 12"x12" Floor Tile & Yellow Mastic	Building 56, Floors	Hallway Outside Room 115	Non-Detect
56	FT1	B56-FT1-02	1	Misc.	Not Damaged	White 12"x12" Floor Tile & Yellow Mastic	Building 56, Floors	Room 107	Non-Detect
56	FT1	B56-FT1-03	1	Misc.	Not Damaged	White 12"x12" Floor Tile & Yellow Mastic	Building 56, Floors	Reception Room 100	Non-Detect
56	CT1	B56-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 56, Ceiling	Room 112	Non-Detect
56	CT1	B56-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 56, Ceiling	Room 107	Non-Detect
56	CT1	B56-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 56, Ceiling	Reception Room 100	Non-Detect
56	CT2	B56-CT2-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile Big Specs	Building 56, Ceiling	Common Area Room Outside Room 218	Non-Detect
56	CT2	B56-CT2-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile Big Specs	Building 56, Ceiling	Room 224	Non-Detect
56	CT2	B56-CT2-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile Big Specs	Building 56, Ceiling	Hallway Outside Room 224	Non-Detect
56	JC	B56-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 56, Walls Throughout	Room 224	Non-Detect
56	JC	B56-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 56, Walls Throughout	Hallway Outside Room 221	Non-Detect
56	JC	B56-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 56, Walls Throughout	Hallway Outside Room 210	Non-Detect
56	CPM	B56-CPM-01	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building 56, Carpets	Room 123	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
66	FT1	B66-FT1-01	1	Misc.	Not Damaged	12"x12" White Floor Tile, Beige Spots	Building 66, Floor	Confrence Room 115	Non-Detect
66	FT1	B66-FT1-02	1	Misc.	Not Damaged	12"x12" White Floor Tile, Beige Spots	Building 66, Floor	Breakroom 121	Non-Detect
66	FT1	B66-FT1-03	1	Misc.	Not Damaged	12"x12" White Floor Tile, Beige Spots	Building 66, Floor	Lobby	Non-Detect
66	CT1	B66-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 66, Ceiling	Confrence Room 115	Non-Detect
66	CT1	B66-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 66, Ceiling	Hallway Outside Room 122	Non-Detect
66	CT1	B66-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile, Specs	Building 66, Ceiling	Lobby	Non-Detect
66	JC	B66-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 66, Walls Throughout	Confrence Room 115	Non-Detect
66	JC	B66-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 66, Walls Throughout	Breakroom 121	Non-Detect
66	JC	B66-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 66, Walls Throughout	House Keeping Closet, HAC	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
67	FT1	B67-FT1-01	1	Misc.	Not Damaged	12"x12" White Floor Tile, Mottled & Yellow Mastic	Building 67, Floor	Room 105	Non-Detect
67	FT1	B67-FT1-02	1	Misc.	Not Damaged	12"x12" White Floor Tile, Mottled & Yellow Mastic	Building 67, Floor	Room 100, Lobby	Non-Detect
67	FT1	B67-FT1-03	1	Misc.	Not Damaged	12"x12" White Floor Tile, Mottled & Yellow Mastic	Building 67, Floor	Equipment Room 112	Non-Detect
67	SV1	B67-SV1-01	1	Misc.	Not Damaged	Light Gray Sheet Vinyl	Building 67, Floor	Room 114	Non-Detect
67	SV1	B67-SV1-02	1	Misc.	Not Damaged	Light Gray Sheet Vinyl	Building 67, Floor	Room 114	Non-Detect
67	SV1	B67-SV1-03	1	Misc.	Not Damaged	Light Gray Sheet Vinyl	Building 67, Floor	Room 114	Non-Detect
67	CT1	B67-CT1-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building 67, Ceiling	Lobby	Non-Detect
67	CT1	B67-CT1-02	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building 67, Ceiling	Room 105	Non-Detect
67	CT1	B67-CT1-03	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building 67, Ceiling	Lab 102	Non-Detect
67	JC	B67-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 67, Walls Throughout	Lobby	Non-Detect
67	JC	B67-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 67, Walls Throughout	Equipment Room 112	Non-Detect
67	JC	B67-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 67, Walls Throughout	Office 108	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
67A	JC	B67A-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building 67A, Walls Throughout	Walls	Non-Detect
67A	JC	B67A-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building 67A, Walls Throughout	Walls	Non-Detect
67A	JC	B67A-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building 67A, Walls Throughout	Walls	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T15C Employee Fitness	WV1	BT15C-WV1-01	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building T15C, Floor	Gym Floor	Non-Detect
T15C Employee Fitness	WV1	BT15C-WV1-02	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building T15C, Floor	Gym Floor	Non-Detect
T15C Employee Fitness	WV1	BT15C-WV1-03	1	Misc.	Not Damaged	Faux Wood Vinyl Flooring	Building T15C, Floor	Gym Floor	Non-Detect
T15C Employee Fitness	CT1	BT15C-CT1-01	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15C, Ceiling	Gym Ceiling	Non-Detect
T15C Employee Fitness	CT1	BT15C-CT1-02	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15C, Ceiling	Gym Ceiling	Non-Detect
T15C Employee Fitness	CT1	BT15C-CT1-03	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15C, Ceiling	Gym Ceiling	Non-Detect
T15C Employee Fitness	JC	BT15C-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Gym Column	Non-Detect
T15C Employee Fitness	JC	BT15C-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Gym Wall	Non-Detect
T15C Employee Fitness	JC	BT15C-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Gym Mens Restroom	Non-Detect
T15C Employee Fitness	MM	BT15C-MM-01	1	Misc.	Not Damaged	Black Mirror Mastic	Building T15C, Mirror	Gym Mirror	6-8% Chrysotile
T15C Employee Fitness	MM	BT15C-MM-02	1	Misc.	Not Damaged	Black Mirror Mastic	Building T15C, Mirror	Gym Mirror	6-8% Chrysotile
T15C Employee Fitness	MM	BT15C-MM-03	1	Misc.	Not Damaged	Black Mirror Mastic	Building T15C, Mirror	Gym Mirror	6-8% Chrysotile

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T15C Police Training	PJC	BT15C-PJC-01	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Near Shooting Screen	Non-Detect
T15C Police Training	PJC	BT15C-PJC-02	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Near Projector	Non-Detect
T15C Police Training	PJC	BT15C-PJC-03	1	Misc.	Not Damaged	White Joint Compound	Building T15C, Walls Throughout	Storage Room Wall	Non-Detect
T15C House Keeping Storage	RFM	BT15C-RFM-01	1	Misc.	Not Damaged	Yellow Rubber Flooring Mastic	Building T15C, House Keeping Storage Area Floor Throughout	Floor Near Door	Non-Detect
T15C House Keeping Storage	RFM	BT15C-RFM-02	1	Misc.	Not Damaged	Yellow Rubber Flooring Mastic	Building T15C, House Keeping Storage Area Floor Throughout	Floor Near Door	Non-Detect
T15C House Keeping Storage	RFM	BT15C-RFM-03	1	Misc.	Not Damaged	Yellow Rubber Flooring Mastic	Building T15C, House Keeping Storage Area Floor Throughout	Floor Near Door	Non-Detect
T15C House Keeping Storage	CT2	BT15C-CT2-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building T15C, House Keeping Storage Area Ceilings Throughout	Ceiling Near Door	Non-Detect
T15C House Keeping Storage	CT2	BT15C-CT2-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building T15C, House Keeping Storage Area Ceilings Throughout	Ceiling Near Door	Non-Detect
T15C House Keeping Storage	CT2	BT15C-CT2-01	1	Misc.	Not Damaged	2'x4' White Ceiling Tile	Building T15C, House Keeping Storage Area Ceilings Throughout	Ceiling Near Door	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T15D	FT1	BT15D-FT1-01	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Yellow Mastic	Building T15D, Restrooms	Restroom	Non-Detect
T15D	FT1	BT15D-FT1-02	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Yellow Mastic	Building T15D, Restrooms	Restroom	Non-Detect
T15D	FT1	BT15D-FT1-03	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Yellow Mastic	Building T15D, Restrooms	Restroom	Non-Detect
T15D	FT2	BT15D-FT2-01	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building T15D, Kitchen	Kitchen	Non-Detect
T15D	FT2	BT15D-FT2-02	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building T15D, Kitchen	Kitchen	Non-Detect
T15D	FT2	BT15D-FT2-03	1	Misc.	Not Damaged	12"x12" Green Floor Tile, Mottled & Yellow Mastic	Building T15D, Kitchen	Kitchen	Non-Detect
T15D	CT1	BT15D-CT1-01	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15D, Ceiling	Ceiling	Non-Detect
T15D	CT1	BT15D-CT1-02	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15D, Ceiling	Ceiling	Non-Detect
T15D	CT1	BT15D-CT1-03	1	Misc.	Not Damaged	White 2'x4' Ceiling Tile, Specs	Building T15D, Ceiling	Ceiling	Non-Detect
T15D	CPM	B15D-CPM-01	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T15D, Carpet Floor	Carpet Floor	Non-Detect
T15D	CPM	B15D-CPM-02	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T15D, Carpet Floor	Carpet Floor	Non-Detect
T15D	CPM	B15D-CPM-03	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T15D, Carpet Floor	Carpet Floor	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T60	CPM	BT60-CPU-01	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T60, Carpet Floors	Room 104 Training	Non-Detect
T60	CPM	BT60-CPU-02	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T60, Carpet Floors	Room 104 Training	Non-Detect
T60	CPM	BT60-CPU-03	1	Misc.	Not Damaged	Yellow Carpet Mastic	Building T60, Carpet Floors	Room 104 Training	Non-Detect
T60	FT1	BT60-FT1-01	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Black Mastic	Building T60, Floors Throughout, Under Carpet Multi-Layered Floor Tile	Room 105 Training	Non-Detect
T60	FT1	BT60-FT1-02	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Black Mastic	Building T60, Floors Throughout, Under Carpet Multi-Layered Floor Tile	Room 105 Training	Non-Detect
T60	FT1	BT60-FT1-03	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Black Mastic	Building T60, Floors Throughout, Under Carpet Multi-Layered Floor Tile	Restroom	Non-Detect
T60	FT1	BT60-FT1-04	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Black Mastic	Building T60, Floors Throughout, Under Carpet Multi-Layered Floor Tile	Room 104 Training	Non-Detect
T60	FT1	BT60-FT1-05	1	Misc.	Not Damaged	12"x12" Gray Floor Tile, Mottled & Black Mastic	Building T60, Floors Throughout, Under Carpet Multi-Layered Floor Tile	Room 104 Training	Non-Detect
T60	FT2	BT60-FT2-01	1	Misc.	Not Damaged	12"x12" Pink Floor Tile, Mottled & Black Mastic	Building T60, Hallway	Hallway	Non-Detect
T60	FT2	BT60-FT2-02	1	Misc.	Not Damaged	12"x12" Pink Floor Tile, Mottled & Black Mastic	Building T60, Hallway	Hallway	Non-Detect
T60	FT2	BT60-FT2-03	1	Misc.	Not Damaged	12"x12" Pink Floor Tile, Mottled & Black Mastic	Building T60, Hallway	Hallway	Non-Detect
T60	FT3	BT60-FT3-01	1	Misc.	Not Damaged	12"x12" Green Floor Tile Laid On-top Of FT1	Building T60, Restrooms	Restroom	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T60	FT3	BT60-FT3-02	1	Misc.	Not Damaged	12"x12" Green Floor Tile Laid On-top Of FT1	Building T60, Restrooms	Restroom	Non-Detect
T60	FT3	BT60-FT3-03	1	Misc.	Not Damaged	12"x12" Green Floor Tile Laid On-top Of FT1	Building T60, Restrooms	Restroom	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T72	JC	BT72-JC-01	1	Misc.	Not Damaged	White Joint Compound	Building T72, Walls Throughout	Walls	Non-Detect
T72	JC	BT72-JC-02	1	Misc.	Not Damaged	White Joint Compound	Building T72, Walls Throughout	Walls	Non-Detect
T72	JC	BT72-JC-03	1	Misc.	Not Damaged	White Joint Compound	Building T72, Walls Throughout	Walls	Non-Detect

Department of Veterans Affairs
New Mexico Veterans Affairs Health Care System
Albuquerque, New Mexico
Contract Number GS-10F-0328R

Building No.	Sample HA	Sample Number	Floor No.	AHERA Categories of Asbestos	Material Condition	Sample Description (Material Type, Size, Texture, Color)	Location of Material	Sample Location	% Asbestos
T74	DS	BT74-DS-01	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building T74, Metal HVAC Ducts	HVAC Metal Ducts	Non-Detect
T74	DS	BT74-DS-02	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building T74, Metal HVAC Ducts	HVAC Metal Ducts	Non-Detect
T74	DS	BT74-DS-03	1	Misc.	Not Damaged	White Metal Duct Seam Mastic	Building T74, Metal HVAC Ducts	HVAC Metal Ducts	Non-Detect

APPENDIX B
LABORATORY REPORTS FOR ASBESTOS
& CHAIN OF CUSTODY

Loflin Environmental Services, Inc. 2020 Montrose Blvd., Houston, Texas 77006
(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240215	B10-FT -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240216	B10-FT -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	TAR, OTHER
L240217	B10-FT -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	TAR, OTHER
L240218	B10-FT -04	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
Analysis results on this test report pertain only to those materials tested.
Disclaimers: Asbestos content is quantified using Calibrated Visual Estimate. PLM analysis has been known to be inaccurate for materials with low concentrations of asbestos. Negative PLM results cannot be guaranteed. LES recommends using TEM analysis for materials reported as <1% or none detected. This report may not be reproduced, except in full, without written approval by LES

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NVLAP 10-2044
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EPA 600/R-93/116, July 1994

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Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240219	B10-FT -05	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L240220	B10-CT -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240221	B10-CT -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240222	B10-CT -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240223	B10-CT -04	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240224	B10-CT -05	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240225*	B10-STM -01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		1-2% AMOSITE	40% MINERAL WOOL CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240226*	B10-STM -02	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		1-2% AMOSITE 1-2% CHRYSOTILE	40% MINERAL WOOL CALCITE, OTHER
L240227*	B10-STM -03	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		1-2% AMOSITE	40% MINERAL WOOL CALCITE, OTHER
L240228*	B10-STM -04	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		1-2% AMOSITE	40% MINERAL WOOL CALCITE, OTHER
L240229	B10-LPS -01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	40% MINERAL WOOL CALCITE
L240230	B10-LPS -02	WHITE, GUMMY HOMOGENEOUS (INSULATION)		NONE DETECTED	OTHER
L240231	B10-SV1 -01	WHITE, ELASTIC NONHOM (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
		WHITE, FIBROUS (BACKING)		NONE DETECTED	45% CELLULOSE OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240232	B10-SV1 -02	WHITE, ELASTIC NONHOM (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
		WHITE, FIBROUS (BACKING)		NONE DETECTED	45% CELLULOSE OTHER
L240233	B10-SV1 -03	WHITE, ELASTIC NONHOM (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
		WHITE, FIBROUS (BACKING)		NONE DETECTED	45% CELLULOSE OTHER,
L240234	B10-RFS -01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	10% GLASS FIBERS OTHER
L240235	B10-RFS -02	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	10% GLASS FIBERS OTHER
L240236	B10-RFS -03	RED, CRUMBLY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L240237	B10-MPSN -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240238	B10-CHWN-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	5% CELLULOSE QUARTZ, OTHER
L240239*	B10-WC-01	WHITE, CRUMBLY HOMOGENEOUS (WINDOW CAULK)		<1% CHRYSOTILE	CALCITE, OTHER
L240240	B10-WC-02	WHITE, CRUMBLY HOMOGENEOUS (WINDOW CAULK)		NONE DETECTED	CALCITE, OTHER
L240241	B10-WC-03	WHITE, CRUMBLY HOMOGENEOUS (WINDOW CAULK)		NONE DETECTED	CALCITE, OTHER
L240242	B10-STC-01	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240243	B10-STC-02	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240244	B10-STC-03	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE

Laboratory Manager

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Departures from the test method: **None**
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Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240245	B10-SV2 -01	BLUE, ELASTIC NONHOM (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240246	B10-LCT -01	BLACK, GRANULAR HOMOGENEOUS (COUNTERTOP)		NONE DETECTED	OTHER
L240247	B10-CT2 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240248	B10-CT2 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240249	B10-CT2 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240250	B10-CBM-01	BROWN, CRUMBLY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L240251	B10-CBM-02	BROWN, CRUMBLY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240252	B10-CBM-03	BROWN, CRUMBLY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L240253	B10-JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240254	B10-JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240255	B10-JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240256	B10-JC-04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240257	B10-JC-05	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240258	B10-FT2 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	CALCITE, OTHER
L240259	B10-FT2 -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240260	B10-FT2 -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	CALCITE, OTHER
L240261	B10-HW -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240262	B10-HW -02	BROWN, CRUMBLY HOMOGENEOUS (SEALANT)		NONE DETECTED	OTHER
L240263*	B10-HW -03	BEIGE, GUMMY HOMOGENEOUS (SEALANT)		3-5% CHRYSOTILE	OTHER
L240264	B10-HW -04	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240265	B10-DW -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240266	B10-DW -02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240267	B10-DW -03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240268	B10-GDS -01	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240269	B10-GDS -02	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240270	B10-GDS -03	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240271	B10-CHWS -01	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240272	B10-CHWS -02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240273	B10-CHWS -03	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE

Laboratory Manager

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Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24U
Project Name: RAYMOND G. MURPHY VA, BLDG. 10; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/09/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240274	B10-CHWR-01	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240275	B10-CHWR-02	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240276*	B10-CHWR-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		3-5% CHRYSOTILE	OTHER
L240277	B10-MPS-01	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240278	B10-MPS-02	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240279	B10-MPS-03	WHITE, FIBROUS HOMOGENEOUS (SEALANT)		NONE DETECTED	35% MINERAL WOOL 5% CELLULOSE CALCITE
L240506	B10-HW-05	WHITE, GUMMY HOMOGENOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239289*	CHWS -01	WHITE, GUMMY HOMOGENEOUS (CHW SUPPLY SEALANT)		3-5% CHRYSOTILE	OTHER
L239290*	CHWS -02	WHITE, GUMMY HOMOGENEOUS (CHW SUPPLY SEALANT)		3-5% CHRYSOTILE	OTHER
L239291*	CHWS -03	WHITE, GUMMY HOMOGENEOUS (CHW SUPPLY SEALANT)		3-5% CHRYSOTILE	OTHER
L239292*	CHWR -01	WHITE, GUMMY HOMOGENEOUS (CHW RETURN SEALANT)		3-5% CHRYSOTILE	OTHER
L239293*	CHWR -02	WHITE, GUMMY HOMOGENEOUS (CHW RETURN SEALANT)		3-5% CHRYSOTILE	OTHER
L239294*	CHWR -03	WHITE, GUMMY HOMOGENEOUS (CHW RETURN SEALANT)		3-5% CHRYSOTILE	OTHER
L239295*	HWS-01	WHITE, GUMMY HOMOGENEOUS (HW SUPPLY SEALANT)		3-5% CHRYSOTILE	OTHER
L239296	HWS-02	WHITE, GUMMY HOMOGENEOUS (HW SUPPLY SEALANT)		NONE DETECTED	10% POLYETHYLENE OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239297*	HWS-03	WHITE, GUMMY HOMOGENEOUS (HW SUPPLY SEALANT)		3-5% CHRYSOTILE	OTHER
L239298	HWR-01	WHITE, GUMMY HOMOGENEOUS (HW RETURN SEALANT)		NONE DETECTED	CALCITE, OTHER
L239299	HWR-02	WHITE, GUMMY HOMOGENEOUS (HW RETURN SEALANT)		NONE DETECTED	10% POLYETHYLENE OTHER
L239300*	HWR-03	WHITE, GUMMY HOMOGENEOUS (HW RETURN SEALANT)		3-5% CHRYSOTILE	OTHER,
L239301	DWS-01	WHITE, CRUMBLY HOMOGENEOUS (DOM. WATER SEALANT)		NONE DETECTED	5% CELLULOSE CALCITE
L239302*	DWS-02	WHITE, GUMMY HOMOGENEOUS (DOM. WATER SEALANT)		3-5% CHRYSOTILE	OTHER
L239303	DWS-03	WHITE, GUMMY HOMOGENEOUS (DOM. WATER SEALANT)		NONE DETECTED	10% POLYETHYLENE OTHER
L239304	FP1-01	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	40% CELLULOSE 5% GLASS FIBERS CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239305	FP1-02	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	40% CELLULOSE 5% GLASS FIBERS CALCITE, OTHER
L239306	FP1-03	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE
L239307	FP1-04	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE
L239308	FP1-05	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE
L239309	FP1-06	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE
L239310	FP1-07	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE
L239311*	DS1-01	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L239312	DS1-02	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, OTHER

Laboratory Manager

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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239313	DS1-03	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L239314	DS2-01	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, OTHER
L239315*	DS2-02	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L239316	DS2-03	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, OTHER
L239317	GDS-01	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L239318	GDS-02	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L239319	GDS-03	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L239320	STM-01	BLACK, GUMMY HOMOGENEOUS (STAIR TREAD MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239321	STM-02	BLACK, GUMMY HOMOGENEOUS (STAIR TREAD MASTIC)		NONE DETECTED	OTHER
L239322	STM-03	BLACK, GUMMY HOMOGENEOUS (STAIR TREAD MASTIC)		NONE DETECTED	OTHER
L239323	RDS-01	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	OTHER
L239324	RDS-02	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	OTHER
L239325	RDS-03	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	10% CELLULOSE OTHER
L239326	FSP-01	BEIGE, CRUMBLY HOMOGENEOUS (FIRESTOP PLASTER)		NONE DETECTED	PERLITE, OTHER
L239327	FSP-02	BEIGE, CRUMBLY HOMOGENEOUS (FIRESTOP PLASTER)		NONE DETECTED	PERLITE, OTHER
L239328	FSP-03	BEIGE, CRUMBLY HOMOGENEOUS (FIRESTOP PLASTER)		NONE DETECTED	3% CELLULOSE PERLITE, OTHER

Laboratory Manager

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Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239329	RFS-01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% SYNTHETICS 5% GLASS FIBERS OTHER
L239330	RFS-02	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% SYNTHETICS 5% GLASS FIBERS OTHER
L239331	RFS-03	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% SYNTHETICS 5% GLASS FIBERS OTHER
L239332	WV1-01	TAN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239333	WV1-02	BROWN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239334	WV1-03	BROWN, ELASTIC HOMOGENEOUS (FLOORING)		NONE DETECTED	5% GLASS FIBERS VINYL, CALCITE

Laboratory Manager

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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239335	WV2-01	TAN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	5% GLASS FIBERS VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239336	WV2-02	TAN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	5% GLASS FIBERS VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239337	WV2-03	TAN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	5% GLASS FIBERS VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239338	STC-01	BEIGE, GRANULAR HOMOGENEOUS (EXT. STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L239339	STC-02	BEIGE, GRANULAR HOMOGENEOUS (EXT. STUCCO)		NONE DETECTED	CALCITE, AGGREGATE

Laboratory Manager

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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239340	STC-03	BEIGE, GRANULAR HOMOGENEOUS (EXT. STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L239341	CB1-01	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L239342	CB1-02	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L239343	CB1-03	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L239344	JC-01	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, CHALKY (SHEET ROCK)		NONE DETECTED	5% GLASS FIBERS OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

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Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239345	JC-02	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
		WHITE, CHALKY (SHEET ROCK)		NONE DETECTED	5% GLASS FIBERS OTHER
L239346	JC-03	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, CHALKY (SHEET ROCK)		NONE DETECTED	5% GLASS FIBERS OTHER
L239347	JC-04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239348	JC-05	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, CHALKY (SHEET ROCK)		NONE DETECTED	5% GLASS FIBERS OTHER
L239349	JC-06	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239350	JC-07	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, CHALKY (SHEET ROCK)		NONE DETECTED	5% GLASS FIBERS OTHER
L239351	JC-08	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239352	JC-09	BEIGE, GRANULAR HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, AGGREGATE
L239353	JC-10	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239354	JC-11	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239355	JC-12	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239356	JC-13	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239357	JC-14	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239358	JC-15	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239359	JC-16	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239360	JC-17	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239361	JC-18	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239362	JC-19	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239363	JC-20	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239364	JC-21	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239365	JC-22	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239366	JC-23	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239367	JC-24	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239368	JC-25	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239369	JC-26	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239370	FT1-01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239371	FT1-02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239372	FT1-03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239373	FT1-04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239374	FT1-05	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239375	FT1-06	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239376	FT1-07	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239377	FT1-08	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239378	FT1-09	BEIGE, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239379	FT1-10	BEIGE, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239380	FT1-11	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239381	FT1A-01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239382	FT1A-02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239383	FT1A-03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239384	FT1A-04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239385	FT1A-05	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239386	FT1A-06	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239387	FT1A-07	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
		BLACK, CRUMBLY (OTHER)		NONE DETECTED	OTHER
L239388	FT2-01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

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L239389	FT2-02	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239390	FT2-03	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239391	FT2-04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239392	FT3-01	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

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L239393	FT3-02	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239394	FT3-03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239395	FT3-04	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239396	FT3-05	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239397	FT3-06	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239398	FT5-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239399	FT5-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239400	FT5-03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239401	FT6-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239402	FT6-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239403	FT6-03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239404	FT7-01	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239405	FT7-02	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239406	FT7-03	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239407	FT8-01	BLUE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239408	FT8-02	BLUE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239409	FT8-03	BLUE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239410	FT9-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	VINYL, CALCITE, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239411	FT9-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	VINYL, CALCITE, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239412	FT9-03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	VINYL, CALCITE, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

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Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239413	FT10-01	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239414	FT10-02	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239415	FT10-03	GRAY, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239416	FT11-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239417	FT11-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
		WHITE, ELASTIC (LINOLEUM)		NONE DETECTED	VINYL, CALCITE
		WHITE, FIBROUS (BACKING)		NONE DETECTED	35% CELLULOSE 15% GLASS FIBERS OTHER
L239418	FT11-03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239419	FT12-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239420	FT12-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239421	FT12-03	WHITE, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239422	CT1-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239423	CT1-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239424	CT1-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239425	CT1-04	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239426	CT1-05	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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NVLAP 10-2044
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Date Received: 08/21/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239427	CT1-06	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239428	CT1-07	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L239429	CT2-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239430	CT2-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239431	CT2-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239432	CT2-04	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239433	CT2-05	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239434	CT2-06	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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L239435	CT2-07	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239436	CT3-01	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239437	CT3-02	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239438	CT3-03	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239439	CT4-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239440	CT4-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239441	CT4-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239442	CT5-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239443	CT5-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239444	CT5-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239445	CT6-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239446	CT6-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239447	CT6-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239448	CT7-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239449	CT7-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239450	CT7-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239451	CPM-01	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239452	CPM-02	GREEN, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239453	CPM-03	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239454	CPM-04	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239455	CPM-05	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239456	CPM-06	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239457	SV1-01	TAN, FIBROUS HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	35% CELLULOSE VINYL
L239458	SV1-02	TAN, FIBROUS HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	35% CELLULOSE VINYL

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239459	SV2-01	WHITE, FIBROUS HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	15% SYNTHETICS VINYL, CALCITE
L239460	SV2-02	WHITE, FIBROUS HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	15% SYNTHETICS VINYL, CALCITE
L239461	SV2-03	WHITE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
L239462	SV3-01	WHITE, ELASTIC NONHOM (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
		WHITE, FIBROUS (BACKING)		NONE DETECTED	45% CELLULOSE OTHER
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239463	SV3-02	WHITE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
L239464	SV4-01	BEIGE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24A
Project Name: ALBUQUERQUE VA; BUILDING 41

Date Received: 08/21/2015
Date Analyzed: 08/21/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239465	SV4-02	BEIGE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	VINYL, CALCITE
L239466	SV4-03	BEIGE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	10% GLASS FIBERS VINYL
L239467	SV5-01	BEIGE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	10% GLASS FIBERS VINYL
L239486	RFS-04	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239487	RFS-05	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% GLASS FIBERS OTHER
L239488*	HWS-04	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		3-5% CHRYSOTILE	OTHER
L239489	JC-27	YELLOW, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239490	FP1-07	WHITE, FIBROUS HOMOGENEOUS (FIREPROOFING)		NONE DETECTED	30% CELLULOSE 15% GLASS FIBERS CALCITE, VERMICULITE

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Ab
Project Name: ALBUQUERQUE VA, BLDG. 41

Date Received: 10/07/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242012*	DS1-04	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242013*	DS1-05	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242014*	DS1-06	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242015*	DS1-07	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242016	DS1-08	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L242017	DS1-09	WHITE, GUMMY HOMOGENEOUS (DUCT INSUL. SEALANT)		NONE DETECTED	CALCITE, OTHER
L242018*	DS2-04	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242019*	DS2-05	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Ab
Project Name: ALBUQUERQUE VA, BLDG. 41

Date Received: 10/07/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242020	HWR-04	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	5% POLYETHYLENE OTHER
L242021*	HWR -04A	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		3-5% CHRYSOTILE	OTHER
L242022	HWR-06	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	2% CELLULOSE 1% WOLLASTONITE OTHER
L242023	RFS-01	WHITE, GUMMY HOMOGENEOUS (ROOF DRAIN SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L242024	RFS-02	WHITE, GUMMY HOMOGENEOUS (ROOF DRAIN SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L242025*	RFS-03	WHITE, GUMMY NONHOM (ROOF DRAIN SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
		WHITE, GUMMY (ROOF DRAIN SEALANT)		3-5% CHRYSOTILE	OTHER
L242026	DHW-01	WHITE, GUMMY HOMOGENEOUS (DOM. HW SEALANT)		NONE DETECTED	5% CELLULOSE OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Ab
Project Name: ALBUQUERQUE VA, BLDG. 41

Date Received: 10/07/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242027	DHW-02	WHITE, GUMMY HOMOGENEOUS (DOM. HW SEALANT)		NONE DETECTED	5% POLYETHYLENE OTHER
L242028	CHW2 -01	WHITE, GUMMY HOMOGENEOUS (CW SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242029	CHW2 -02	WHITE, GUMMY HOMOGENEOUS (CW SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242030	CHW2 -03	WHITE, GUMMY HOMOGENEOUS (CW SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242031	DS3-01	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242032*	CHWX -01	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		3-5% CHRYSOTILE	OTHER
L242033*	CHWX -02	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		3-5% CHRYSOTILE	OTHER
L242034*	CHWX -03	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		3-5% CHRYSOTILE	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Ab
Project Name: ALBUQUERQUE VA, BLDG. 41

Date Received: 10/07/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242035*	HWX-01	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		3-5% CHRYSOTILE	OTHER
L242036*	HWX-02	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		3-5% CHRYSOTILE	OTHER
L242037*	HWX-03	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		3-5% CHRYSOTILE	OTHER
L242038*	STMX-01	WHITE, GUMMY HOMOGENEOUS (STEAM SYSTEM SEALANT)		3-5% CHRYSOTILE	OTHER
L242039*	STMX-02	WHITE, GUMMY HOMOGENEOUS (STEAM SYSTEM SEALANT)		3-5% CHRYSOTILE	OTHER
L242040*	STMX-03	WHITE, GUMMY HOMOGENEOUS (STEAM SYSTEM SEALANT)		3-5% CHRYSOTILE	OTHER
L242041*	DS2X-01	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242042	DS2X-02	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		NONE DETECTED	5% POLYETHYLENE OTHER

Laboratory Manager

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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Ab
Project Name: ALBUQUERQUE VA, BLDG. 41

Date Received: 10/07/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242043*	DS2X-03	WHITE, GUMMY HOMOGENEOUS (AHU INSUL. SEALANT)		3-5% CHRYSOTILE	OTHER
L242044	DSSX-01	WHITE, GUMMY HOMOGENEOUS (DUCT SEAM SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242045	DSSX-02	WHITE, GUMMY HOMOGENEOUS (DUCT SEAM SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242046	DSSX-03	WHITE, GUMMY HOMOGENEOUS (DUCT SEAM SEALANT)		NONE DETECTED	3% SYNTHETICS CALCITE, OTHER
L242489*	RFS-04	WHITE, GUMMY HOMOGENOUS (DRAIN SEALANT)		2-4% CHRYSOTILE	QUARTZ, OTHER
L242490	RFS-05	WHITE, GUMMY HOMOGENOUS (DRAIN SEALANT)		NONE DETECTED	3% CEULLOSE 2% WOLLASTONITE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24E
Project Name: RAYMOND G. MURPHY VA, BLDG. 42; 1244.019C00 ST002

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239720	B42-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239721	B42-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239722	B42-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239723*	B42-GEX -01	WHITE, GUMMY NONHOM (EXHAUST INS. MASTIC)		3-5% CHRYSOTILE	OTHER
		WHITE, FIBROUS (EXHAUST INS.)		NONE DETECTED	35% CELLULOSE CALCITE, OTHER
L239724*	B42-GEX -02	WHITE, GUMMY NONHOM (EXHAUST INS. MASTIC)		3-5% CHRYSOTILE	OTHER
		WHITE, FIBROUS (EXHAUST INS.)		NONE DETECTED	35% CELLULOSE CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24E
Project Name: RAYMOND G. MURPHY VA, BLDG. 42; 1244.019C00 ST002

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239725*	B42-GEX -03	WHITE, GUMMY NONHOM (EXHAUST INS. MASTIC)		3-5% CHRYSOTILE	OTHER
		WHITE, FIBROUS (EXHAUST INS.)		NONE DETECTED	35% CELLULOSE CALCITE, OTHER
L239726	B42-HW -01	BEIGE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L239727	B42-HW -02	BEIGE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L239728	B42-HW -03	BEIGE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	5% CELLULOSE OTHER
L239729*	B42-DW -01	BEIGE, GUMMY HOMOGENEOUS (DW SEALANT)		3-5% CHRYSOTILE	OTHER
L239730*	B42-DW -02	BEIGE, GUMMY HOMOGENEOUS (DW SEALANT)		3-5% CHRYSOTILE	OTHER
L239731*	B42-DW -03	BEIGE, GUMMY HOMOGENEOUS (DW SEALANT)		3-5% CHRYSOTILE	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24E
Project Name: RAYMOND G. MURPHY VA, BLDG. 42; 1244.019C00 ST002

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239732	B42-STC -01	BEIGE, CRUMBLY HOMOGENEOUS (STUCCO)		NONE DETECTED	3% CELLULOSE AGGREGATE, OTHER
L239733	B42-STC -02	BEIGE, CRUMBLY HOMOGENEOUS (STUCCO)		NONE DETECTED	3% CELLULOSE AGGREGATE, OTHER
L239734	B42-STC -03	BEIGE, CRUMBLY HOMOGENEOUS (STUCCO)		NONE DETECTED	3% CELLULOSE AGGREGATE, OTHER
L239735	B42-CLK -01	BEIGE, GUMMY HOMOGENEOUS (CAULK)		NONE DETECTED	OTHER
L239736	B42-CLK -02	BEIGE, GUMMY HOMOGENEOUS (CAULK)		NONE DETECTED	OTHER
L239737	B42-CLK -03	BEIGE, GUMMY HOMOGENEOUS (CAULK)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24V
Project Name: RAYMOND G. MURPHY VA, BLDG. 43; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240602	B43-BFW-01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240603*	B43-BFW-02	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		3-5% CHRYSOTILE	OTHER
L240604*	B43-BFW-03	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		3-5% CHRYSOTILE	OTHER
L240605	B43-BFW-04	WHITE, GUMMY HOMOGENEOUS (INSULATION)		NONE DETECTED	QUARTZ, OTHER
L240606*	B43-BFW-05	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		3-5% CHRYSOTILE	OTHER

Laboratory Manager

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Departures from the test method: **None**
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(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24V
Project Name: RAYMOND G. MURPHY VA, BLDG. 43; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240607	B43-BFW-06	WHITE, GUMMY HOMOGENEOUS (INSULATION)		NONE DETECTED	QUARTZ, OTHER
L240608*	B43-BFWT-01	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		3-5% CHRYSOTILE	OTHER
L240609	B43-BFWT-02	WHITE, GUMMY HOMOGENEOUS (INSULATION)		NONE DETECTED	QUARTZ, OTHER
L240610	B43-BFWT-03	WHITE, GUMMY HOMOGENEOUS (INSULATION)		NONE DETECTED	QUARTZ, OTHER
L240611	B43-BD -01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	35% MINERAL WOOL CALCITE
L240612	B43-BD -02	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		GRAY, GUMMY (INSULATION)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Project Name: RAYMOND G. MURPHY VA, BLDG. 43; 1244.019C.00 ST002

Date Received: 08/24/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240613*	B43-BD -03	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (INSULATION)		3-5% CHRYSOTILE	OTHER
L240614	B43-BD -04	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240615	B43-BD -05	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		BEIGE, GUMMY (INSULATION)		NONE DETECTED	OTHER
L240616*	B43-LPS -01	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		WHITE, GUMMY (INSULATION)		3-5% CHRYSOTILE	2% CELLULOSE QUARTZ, OTHER
L240617*	B43-LPS -02	WHITE, GUMMY HOMOGENEOUS (INSULATION)		3-5% CHRYSOTILE	2% CELLULOSE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Date Received: 08/24/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240618*	B43-LPS -03	WHITE, GUMMY NONHOM (INSULATION)		3-5% CHRYSOTILE	2% CELLULOSE QUARTZ, OTHER
		GRAY, FIBROUS (INSULATION)		NONE DETECTED	35% MINERAL WOOL CALCITE
L240619*	B43-MPS -01	WHITE, GUMMY NONHOM (INSULATION)		3-5% CHRYSOTILE	OTHER
		GRAY, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240620*	B43-MPS -02	WHITE, GUMMY NONHOM (INSULATION)		3-5% CHRYSOTILE	OTHER
		GRAY, FIBROUS (INSULATION)		NONE DETECTED	35% MINERAL WOOL CALCITE
L240621	B43-MPS -03	BEIGE, CRUMBLY NONHOM (INSULATION)		NONE DETECTED	OTHER
		WHITE, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

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Project No: 750-15-24V
Project Name: RAYMOND G. MURPHY VA, BLDG. 43; 1244.019C.00 ST002

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240622	B43-DRN -01	BEIGE, CRUMBLY HOMOGENEOUS (INSULATION)		NONE DETECTED	OTHER
		WHITE, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240623	B43-DRN -02	WHITE, GUMMY NONHOM (INSULATION)		NONE DETECTED	2% CELLULOSE QUARTZ, OTHER
		WHITE, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240624	B43-DRN -03	WHITE, CRUMBLY NONHOM (INSULATION)		NONE DETECTED	OTHER
		WHITE, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240625	B43-DRN -04	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	35% CELLULOSE OTHER

Laboratory Manager

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Departures from the test method: **None**
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Project Name: RAYMOND G. MURPHY VA, BLDG. 43; 1244.019C.00 ST002

Date Received: 08/24/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240626*	B43-CON-01	WHITE, GUMMY NONHOM (INSULATION)		3-5% CHRYSOTILE	OTHER
		WHITE, FIBROUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
		GRAY, FIBROUS (INSULATION)		NONE DETECTED	35% MINERAL WOOL CALCITE
L240627	B43-CON-02	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	35% CELLULOSE CALCITE
L240628	B43-SH-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240629	B43-SH-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240630	B43-SH-03	WHITE, GUMMY NONHOM (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
		TAN, CRUMBLY (INSULATION)		NONE DETECTED	2% WOLLASTONITE OTHER

Laboratory Manager

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Departures from the test method: **None**
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240631*	B43-PLC -01	TAN, CRUMBLY HOMOGENEOUS (COATING)		2-3% CHRYSOTILE	OTHER
L240632	B43-PLC -02	BEIGE, CRUMBLY HOMOGENEOUS (COATING)		NONE DETECTED	1% CELLULOSE OTHER
L240633	B43-PLC -03	BEIGE, CRUMBLY HOMOGENEOUS (COATING)		NONE DETECTED	1% CELLULOSE OTHER
L240634	B43-CF -01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	40% MINERAL WOOL CALCITE, OTHER
L240635	B43-CF -02	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	45% CELLULOSE CALCITE
L240636*	B43-CF -03	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	45% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		2-4% CHRYSOTILE	OTHER
L240637	B43-HW -01	WHITE, GUMMY HOMOGENEOUS (INSULATION MASTIC)		NONE DETECTED	3% CELLULOSE OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240638	B43-HW -02	WHITE, GUMMY HOMOGENEOUS (INSULATION MASTIC)		NONE DETECTED	3% CELLULOSE OTHER
L240639	B43-CTNK-01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	40% MINERAL WOOL CALCITE, OTHER
L240640*	B43-CTNK-02	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	40% MINERAL WOOL CALCITE, OTHER
		WHITE, GUMMY (MASTIC)		3-5% CHRYSOTILE	OTHER
L240641	B43-CTNK-03	WHITE, FIBROUS NONHOM (INSULATION)		NONE DETECTED	40% MINERAL WOOL CALCITE, OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	2% CELLULOSE OTHER
L240642	B43-CHW-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240643	B43-CHW-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240644	B43-CHW-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240645	B43-CHEW-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240646	B43-CHEW-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240647	B43-CHEW-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240648	B43-DW-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240649*	B43-SHB-01	WHITE, FIBROUS HOMOGENEOUS (INSULATION)		NONE DETECTED	45% CELLULOSE CALCITE
		WHITE, GUMMY (MASTIC)		2-4% CHRYSOTILE	OTHER
L240650*	B43-EPG-01	BEIGE, FIBROUS HOMOGENEOUS (GASKET)		95% CHRYSOTILE	OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240651	B43-FT1 -01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240652	B43-FT1 -02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240653	B43-FT1 -03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240654	B43-FT1 -04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240655	B43-FT1 -05	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L240656	B43-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L240657	B43-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L240658	B43-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 40% MINERAL WOOL PERLITE, OTHER
L240659	B43-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240660	B43-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240661	B43-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Date Received: 08/24/2015
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Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240662	B43-JC -04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240663	B43-JC -05	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240664	B43-STC -01	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240665	B43-STC -02	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240666	B43-STC -03	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

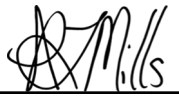
Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Vb
Project Name: ALBUQUERQUE VA, BLDG. 43

Date Received: 10/06/2015
Date Analyzed: 10/06/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242003*	VNT-01	WHITE, GUMMY HOMOGENEOUS (VENT LINE SEALANT)		3-5% CHRYSOTILE	OTHER
L242004*	VNT-02	WHITE, GUMMY HOMOGENEOUS (VENT LINE SEALANT)		3-5% CHRYSOTILE	OTHER
L242005*	VNT-03	WHITE, GUMMY HOMOGENEOUS (VENT LINE SEALANT)		3-5% CHRYSOTILE	OTHER
L242006*	VNT-04	WHITE, GUMMY HOMOGENEOUS (VENT LINE SEALANT)		3-5% CHRYSOTILE	OTHER
L242007	BP-01	WHITE, GUMMY HOMOGENEOUS (BYPASS SEALANT)		NONE DETECTED	1% WOLLASTONITE 1% CELLULOSE QUARTZ, OTHER
L242008	BP-02	WHITE, GUMMY HOMOGENEOUS (BYPASS SEALANT)		NONE DETECTED	1% WOLLASTONITE 1% CELLULOSE QUARTZ, OTHER
L242009	BP-03	WHITE, GUMMY HOMOGENEOUS (BYPASS SEALANT)		NONE DETECTED	1% WOLLASTONITE 1% CELLULOSE QUARTZ, OTHER
L242010	CON-03	WHITE, GUMMY HOMOGENEOUS (CONDENSATE SEALANT)		NONE DETECTED	1% WOLLASTONITE 1% CELLULOSE QUARTZ, OTHER



Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Vb
Project Name: ALBUQUERQUE VA, BLDG. 43

Date Received: 10/06/2015
Date Analyzed: 10/06/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242011*	CON-04	WHITE, GUMMY HOMOGENEOUS (CONDENSATE SEALANT)		3-5% CHRYSOTILE	OTHER
l242047*	CON-05	WHITE, GUMMY HOMOGENEOUS (CONDENSATE SEALANT)		3-5% CHRYSOTILE	OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24T
Project Name: RAYMOND G MURPHY VA, BLDG. 43A; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240209	B43A-PSO-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE OTHER
L240210	B43A-PSO-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE OTHER
L240211	B43A-PSO-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE OTHER
L240212	B43A-STC-04	TAN, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	2% GLASS FIBERS CALCITE, AGGREGATE, OTHER
L240213	B43A-STC-05	TAN, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	2% GLASS FIBERS CALCITE, AGGREGATE, OTHER
L240214	B43A-STC-06	TAN, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	2% GLASS FIBERS CALCITE, AGGREGATE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240442	B45-FT1 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ,
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240443	B45-FT1 -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240444	B45-FT1 -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BROWN, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240445	B45-FT1 -04	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BROWN, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240446	B45-FT1 -05	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BROWN, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240447	B45-FT1A-01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240448	B45-FT1A-02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240449	B45-FT1A-03	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	1% CELLULOSE CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240450	B45-FT1A-04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240451	B45-FT1A-05	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240452	B45-FT2-01	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240453	B45-FT2-02	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240454	B45-FT2 -03	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240455	B45-FT2 -04	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240456	B45-FT2 -05	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
		BEIGE, CRUMBLY (OTHER)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240457	B45-FT2A-01	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L240458	B45-FT2A-02	LT. GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	1% CELLULOSE CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L240459	B45-FT2A-03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	QUARTZ, OTHER
L240460	B45-FT2A-04	LT. GREEN, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	1% CELLULOSE CALCITE, VINYL, QUARTZ
L240461	B45-FT2A-05	LT. GREEN, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	1% CELLULOSE CALCITE, VINYL, QUARTZ

Laboratory Manager

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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240462	B45-FT3 -01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240463	B45-FT3 -02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240464	B45-FT3 -03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240465	B45-CT1 -01	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	50% CELLULOSE 20% MINERAL WOOL PERLITE, OTHER
L240466	B45-CT1 -02	NO SAMPLE			

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240467	B45-CT1 -03	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	50% CELLULOSE 20% MINERAL WOOL PERLITE, OTHER
L240468	B45-CT1 -04	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	50% CELLULOSE 20% MINERAL WOOL PERLITE, OTHER
L240469	B45-CT1 -05	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	50% CELLULOSE 20% MINERAL WOOL PERLITE, OTHER
L240470	B45-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240471	B45-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240472	B45-JC -03	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L240473	B45-JC -04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240474	B45-JC -05	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240475	B45-CB1 -01	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L240476	B45-CB1 -02	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L240477	B45-CB1 -03	YELLOW, GUMMY HOMOGENEOUS (COVE BASE MASTIC)		NONE DETECTED	OTHER
L240478	B45-RDS -01	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240479	B45-RDS -02	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240480	B45-RDS -03	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L240481	B45-GDS -01	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240482	B45-HW -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240483	B45-HW -02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240484	B45-HW -03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240485	B45-HW -04	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240486	B45-MPS -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240487	B45-MPS -02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240488	B45-MPS -03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240489	B45-CON-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
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EPA 600/R-93/116, July 1994

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Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240490	B45-CON-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	CALCITE, OTHER
L240491	B45-CON-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240492	B45-CW-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240493	B45-CW-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240494	B45-CW-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE CALCITE, QUARTZ, OTHER
L240495	B45-DM-01	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	CALCITE, OTHER
L240496	B45-DM-02	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	CALCITE, OTHER
L240497	B45-DM-03	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

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Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240498	B45-DM -04	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	CALCITE, OTHER
L240499	B45-WDS-01	WHITE, GUMMY NONHOM (SEALANT)		NONE DETECTED	CALCITE, OTHER
		GRAY, GUMMY (SEALANT)		NONE DETECTED	CALCITE, OTHER
L240500	B45-WDS-02	WHITE, GUMMY NONHOM (SEALANT)		NONE DETECTED	CALCITE, OTHER
		GRAY, GUMMY (SEALANT)		NONE DETECTED	CALCITE, OTHER
L240501	B45-WDS-03	WHITE, GUMMY NONHOM (SEALANT)		NONE DETECTED	CALCITE, OTHER
		GRAY, GUMMY (SEALANT)		NONE DETECTED	CALCITE, OTHER
L240502	B45-RFS -01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	3% GLASS FIBERS QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24K
Project Name: RAYMOND G. MURPHY VA, BLDG. 45; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/11/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240503	B45-STC -01	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240504	B45-STC -02	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE
L240505	B45-STC -03	BEIGE, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	CALCITE, AGGREGATE

Laboratory Manager

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Departures from the test method: **None**
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24F
Project Name: RAYMOND G. MURPHY VA, BLDG. 46; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239752	B46-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239753	B46-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239754	B46-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239755	B46-CT2 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239756	B46-CT2 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239757	B46-CT2 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239758	B46-CDS -01	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L239759	B46-CDS -02	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

Client: MECx, INC.
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Project No: 750-15-24F
Project Name: RAYMOND G. MURPHY VA, BLDG. 46; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239760	B46-CDS -03	GRAY, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	CALCITE, OTHER
L239761	B46-CT3 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239762	B46-CT3 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239763	B46-CT3 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239764	B46-JC -01	BEIGE, CRUMBLY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, AGGREGATE
L239765	B46-JC -02	BEIGE, CRUMBLY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, AGGREGATE
L239766	B46-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

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Project No: 750-15-24F
Project Name: RAYMOND G. MURPHY VA, BLDG. 46; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239767*	B46-FT1 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		5-7% CHRYSOTILE	TAR, OTHER
L239768	B46-FT1 -02	**NOT ANALYZED DUE TO POSITIVE STOP			
L239769	B46-FT1 -03	**NOT ANALYZED DUE TO POSITIVE STOP			
L239770	B46-FT2 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239771	B46-FT2 -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Project No: 750-15-24F
Project Name: RAYMOND G. MURPHY VA, BLDG. 46; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239772	B46-FT2 -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239773*	B46-RBM-01	BLACK, TARRY HOMOGENEOUS (FLOOR MASTIC)		6-8% CHRYSOTILE	TAR, OTHER
L239774	B46-RBM-02	**NOT ANALYZED DUE TO POSITIVE STOP			
L239775	B46-RBM-03	**NOT ANALYZED DUE TO POSITIVE STOP			

Laboratory Manager

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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240134	B49-FT1 -01	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240135	B49-FT1 -02	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240136	B49-FT1 -03	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240137	B49-FT2 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240138	B49-FT2 -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L240139	B49-FT2 -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L240140	B49-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240141	B49-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240142	B49-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240143	B49-CT2 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240144	B49-CT2 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240145	B49-CT2 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240146	B49-CT3 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240147	B49-CT3 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240148	B49-CT3 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240149	B49-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240150	B49-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240151	B49-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
Analysis results on this test report pertain only to those materials tested.
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Loflin Environmental Services, Inc. 2020 Montrose Blvd., Houston, Texas 77006
(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240152	B49-CHW-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240153	B49-CHW-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240154	B49-CHW-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L240155	B49-HW1-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240156	B49-HW1-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240157	B49-HW1-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240158	B49-HRS-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240159	B49-HRS-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240160	B49-HRS -03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240161	B49-CON-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240162	B49-CON-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240163	B49-CON-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE QUARTZ, OTHER
L240164	B49-DM -01	WHITE, GUMMY HOMOGENEOUS (DUCT MASTIC)		NONE DETECTED	3% WOLLASTONITE OTHER
L240165	B49-DM -02	WHITE, GUMMY HOMOGENEOUS (DUCT MASTIC)		NONE DETECTED	3% WOLLASTONITE OTHER
L240166	B49-DM -03	WHITE, GUMMY HOMOGENEOUS (DUCT MASTIC)		NONE DETECTED	3% WOLLASTONITE OTHER
L240167	B49-HW2-01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE OTHER

Laboratory Manager

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Departures from the test method: **None**
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EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24R
Project Name: RAYMOND G. MURPHY, BLDG. 49; 1244.019C.00 ST00C

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240168	B49-HW2-02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE OTHER
L240169	B49-HW2-03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	3% WOLLASTONITE OTHER
L240170	B49-RDS-01	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	3% POLYETHYLENE OTHER
L240171	B49-RDS-02	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	3% POLYETHYLENE OTHER
L240172	B49-RDS-03	RED, GUMMY HOMOGENEOUS (DUCT SEALANT)		NONE DETECTED	3% POLYETHYLENE OTHER
L240173	B49-NDT-01	BLACK, GUMMY HOMOGENEOUS (OTHER)		NONE DETECTED	5% CELLULOSE OTHER

Laboratory Manager

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Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24S
Project Name: RAYMOND G MURPHY VA, BLDG. 50; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240280	B50-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240281	B50-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240282	B50-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240283	B50-FT1 -01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240284	B50-FT1 -02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24S
Project Name: RAYMOND G MURPHY VA, BLDG. 50; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240285	B50-FT1 -03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240286	B50-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L240287	B50-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L240288	B50-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L240289	B50-WV -01	TAN, ELASTIC NONHOM (VINYL FLOORING)		NONE DETECTED	VINYL, CALCITE
		GREEN, GRANULAR (OTHER)		NONE DETECTED	2% CELLULOSE AGGREGATE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24S
Project Name: RAYMOND G MURPHY VA, BLDG. 50; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240290	B50-WV -02	TAN, ELASTIC NONHOM (VINYL FLOORING)		NONE DETECTED	VINYL, CALCITE
		GREEN, GRANULAR (OTHER)		NONE DETECTED	2% CELLULOSE AGGREGATE, OTHER
L240291	B50-WV -03	TAN, ELASTIC HOMOGENEOUS (VINYL FLOORING)		NONE DETECTED	VINYL, CALCITE
L240292	B50-FT2 -01	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240293	B50-FT2 -02	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24S
Project Name: RAYMOND G MURPHY VA, BLDG. 50; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/04/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240294	B50-FT2 -03	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24C
Project Name: RAYMOND G. MURPHY VA, BLDG. 52; 1244.019C.00 ST001

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239683	B52-FT1 -01	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239684	B52-FT1 -02	TAN, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239685	B52-FT1 -03	TAN, GRANULAR HOMOGENEOUS (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
L239686	B52-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239687	B52-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239688	B52-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239689	B52-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24C
Project Name: RAYMOND G. MURPHY VA, BLDG. 52; 1244.019C.00 ST001

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239690	B52-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239691	B52-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239692	B52-JC -04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239693	B52-JC -05	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, OTHER
L239694	B52-HW -01	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	CALCITE, OTHER
L239695	B52-HW -02	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	CALCITE, OTHER
L239696	B52-HW -03	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	CALCITE, OTHER
L239697	B52-RFS -01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
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Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24C
Project Name: RAYMOND G. MURPHY VA, BLDG. 52; 1244.019C.00 ST001

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239698	B52-RFS -02	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239699	B52-RFS -03	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239700	B52-WV -01	TAN, ELASTIC HOMOGENEOUS (VINYL FLOORING)		NONE DETECTED	VINYL, OTHER
L239701	B52-WV -02	TAN, ELASTIC NONHOM (VINYL FLOORING)		NONE DETECTED	VINYL, OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239702	B52-WV -03	TAN, ELASTIC NONHOM (VINYL FLOORING)		NONE DETECTED	VINYL, OTHER
		WHITE, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239703	B52-CHW-01	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)	MECH.	NONE DETECTED	3% CELLULOSE QUARTZ, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24C
Project Name: RAYMOND G. MURPHY VA, BLDG. 52; 1244.019C.00 ST001

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239704	B52-CHW-02	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)	MECH.	NONE DETECTED	3% CELLULOSE QUARTZ, OTHER
L239705	B52-CHW-03	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)	MECH.	NONE DETECTED	3% CELLULOSE QUARTZ, OTHER

Laboratory Manager

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Departures from the test method: **None**
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24 I
Project Name: VA Medical Center – Albuquerque, NM, Building 53

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239853	DW-01	WHITE, GUMMY HOMOGENEOUS (DW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239854	DW-02	WHITE, GUMMY HOMOGENEOUS (DW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239855	DW-03	WHITE, GUMMY HOMOGENEOUS (DW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239856	HW-01	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239857	HW-02	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239858	HW-03	WHITE, GUMMY HOMOGENEOUS (HW SEALANT)		NONE DETECTED	10% CELLULOSE, QUARTZ, OTHER
L239859	CHW-01	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Disclaimers: Asbestos content is quantified using Calibrated Visual Estimate. PLM analysis has been known to be inaccurate for materials with low concentrations of asbestos. Negative PLM results cannot be guaranteed. LES recommends using TEM analysis for materials reported as <1% or none detected. This report may not be reproduced, except in full, without written approval by LES.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24 I
Project Name: VA Medical Center – Albuquerque, NM, Building 53

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239860	CHW-02	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		NONE DETECTED	OTHER
L239861	CHW-03	WHITE, GUMMY HOMOGENEOUS (CHW SEALANT)		NONE DETECTED	OTHER
L239862	CT1-01	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE. PERLITE 45% MINERAL WOOL
L239863	CT1-02	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE. PERLITE 45% MINERAL WOOL
L239864	CT1-03	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	45% CELLULOSE. PERLITE 45% MINERAL WOOL
L239865	RFS-01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	OTHER
L239866	RFS-02	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24 I
Project Name: VA Medical Center – Albuquerque, NM, Building 53

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239867	RFS-03	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	OTHER
L239868	FT1-01	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		CLEAR, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239869	FT1-02	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		CLEAR, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239870	FT1-03	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		CLEAR, GUMMY (MASTIC)		NONE DETECTED	OTHER

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Laboratory Manager

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Departures from the test method: ***None***
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24 I
Project Name: VA Medical Center – Albuquerque, NM, Building 53

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239871	JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239872	JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239873	JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239874	JC-04	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239875	JC-05	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239876	WV1-01	WHITE, FLEXIBLE NON-HOM. (VINYL FLOORING)		NONE DETECTED	10% GLASS FIBER, OTHER
L239877	WV1-02	WHITE, FLEXIBLE NON-HOM. (VINYL FLOORING)		NONE DETECTED	10% GLASS FIBER, OTHER

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Laboratory Manager

**Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.*
Departures from the test method: ***None***
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24 I
Project Name: VA Medical Center – Albuquerque, NM, Building 53

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239878	WV1-03	WHITE, FLEXIBLE NON-HOM. (VINYL FLOORING)		NONE DETECTED	10% GLASS FIBER, OTHER

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Laboratory Manager

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Departures from the test method: ***None***
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24D
Project Name: RAYMOND G. MURPHY VA, BLDG. 54; 1244.019C00 ST002

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239706	B54-FT1 -01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239707	B54-FT1 -02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239708	B54-FT1 -03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239709	B54-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239710	B54-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24D
Project Name: RAYMOND G. MURPHY VA, BLDG. 54; 1244.019C00 ST002

Date Received: 08/28/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239711	B54-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239712	B54-FS -01	YELLOW, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239713	B54-FS -02	YELLOW, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239714	B54-FS -03	YELLOW, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	CALCITE, OTHER
L239715	B54-CPM-01	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239716	B54-CPM-02	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239717	B54-CPM-03	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24B
Project Name: RAYMOND G MURPHY VA, BUILDING 55; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239647	B55-FT1 -01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239648	B55-FT1 -02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239649	B55-FT1 -03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, CRUMBLY (MASTIC)		NONE DETECTED	OTHER
L239650	B55-CT1 -01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239651	B55-CT1 -02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24B
Project Name: RAYMOND G MURPHY VA, BUILDING 55; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 08/28/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239652	B55-CT1 -03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L239653	B55-RFS -01	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% GLASS FIBERS CALCITE, OTHER
L239654	B55-RFS -02	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% GLASS FIBERS CALCITE, OTHER
L239655	B55-RFS -03	RED, GUMMY HOMOGENEOUS (FIRESTOP)		NONE DETECTED	5% GLASS FIBERS CALCITE, OTHER
L239656	B55-CPM-01	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239657	B55-CPM-02	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER
L239658	B55-CPM-03	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	QUARTZ, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24
Project Name: VA Medical Center – Albuquerque, NM, Building 56

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239832	FT1-01	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239833	FT1-02	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239834	FT1-03	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239835	CT1-01	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L239836	CT1-02	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL

_____
Laboratory Manager

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Departures from the test method: **None**
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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24
Project Name: VA Medical Center – Albuquerque, NM, Building 56

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239837	CT1-03	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L239838	CT2-01	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L239839	CT2-02	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L239840	CT2-03	GRAY, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L239841	JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239842	JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L239843	JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24
Project Name: VA Medical Center – Albuquerque, NM, Building 56

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239844	CPM-01	BROWN, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239845	CPM-02	BROWN, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239846	CPM-03	BROWN, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L239847	FT2-01	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239848	FT2-02	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

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Client: MECx
Client Address: Houston, TX
Project No: 750-15-24
Project Name: VA Medical Center – Albuquerque, NM, Building 56

Date Received: 8/24/15
Date Analyzed: 831/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239849	FT2-03	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239850	STC-01	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	10% GALSS FIBER, AGGREGATE, OTHER
L239851	STC-02	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	10% GALSS FIBER, AGGREGATE, OTHER
L239852	STC-03	GRAY, GRANULAR HOMOGENEOUS (STUCCO)		NONE DETECTED	10% GALSS FIBER, AGGREGATE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Disclaimers: Asbestos content is quantified using Calibrated Visual Estimate. PLM analysis has been known to be inaccurate for materials with low concentrations of asbestos. Negative PLM results cannot be guaranteed. LES recommends using TEM analysis for materials reported as <1% or none detected. This report may not be reproduced, except in full, without written approval by LES.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24L
Project Name: VA Medical Center – Albuquerque, NM, Building 66

Date Received: 8/24/15
Date Analyzed: 9/3/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240038	FT1-01	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240039	FT1-02	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240040	FT1-03	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240041	CT1-01	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL

Laboratory Manager

**Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.*
Departures from the test method: ***None***
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24L
Project Name: VA Medical Center – Albuquerque, NM, Building 66

Date Received: 8/24/15
Date Analyzed: 9/3/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240042	CT1-02	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L240043	CT1-03	BEIGE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE, PERLITE 40% MINERAL WOOL
L240044	JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240045	JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240046	JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

**Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.*
Departures from the test method: ***None***
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24M
Project Name: VA Medical Center – Albuquerque, NM, Building 67

Date Received: 8/24/15
Date Analyzed: 9/3/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240026	FT1-01	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240027	FT1-02	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240028	FT1-03	WHITE, GRANULAR NON-HOM. (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240029	SV1-01	WHITE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	OTHER

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Laboratory Manager

**Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.*
Departures from the test method: ***None***
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TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24M
Project Name: VA Medical Center – Albuquerque, NM, Building 67

Date Received: 8/24/15
Date Analyzed: 9/3/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240030	SV1-02	WHITE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	OTHER
L240031	SV1-03	WHITE, ELASTIC HOMOGENEOUS (SHEET VINYL)		NONE DETECTED	OTHER
L240032	CT1-01	TAB, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	60% CELLULOSE, PERLITE 30% MINERAL WOOL
L240033	CT1-02	TAB, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	60% CELLULOSE, PERLITE 30% MINERAL WOOL
L240034	CT1-03	TAB, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	60% CELLULOSE, PERLITE 30% MINERAL WOOL
L240035	JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240036	JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

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Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx
Client Address: Houston, TX
Project No: 750-15-24M
Project Name: VA Medical Center – Albuquerque, NM, Building 67

Date Received: 8/24/15
Date Analyzed: 9/3/15

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240037	JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

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Laboratory Manager

**Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.*
Departures from the test method: ***None***
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24N
Project Name: RAYMOND G MURPHY VA, BLDG. 67A; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240068	B67A-JC -01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240069	B67A-JC -02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240070	B67A-JC -03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
Analysis results on this test report pertain only to those materials tested.
Disclaimers: Asbestos content is quantified using Calibrated Visual Estimate. PLM analysis has been known to be inaccurate for materials with low concentrations of asbestos. Negative PLM results cannot be guaranteed. LES recommends using TEM analysis for materials reported as <1% or none detected. This report may not be reproduced, except in full, without written approval by LES

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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Q
Project Name: RAYMOND G. MURPHY VA, BLDG. T15C; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240047	BT15C-WV1-01	TAN, ELASTIC HOMOGENEOUS (FLOORING)		NONE DETECTED	10% SYNTHETICS VINYL, CALCITE
L240048	BT15C-WV1-02	TAN, ELASTIC NONHOM (FLOORING)		NONE DETECTED	10% SYNTHETICS VINYL, CALCITE
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240049	BT15C-WV1-03	TAN, ELASTIC HOMOGENEOUS (FLOORING)		NONE DETECTED	10% SYNTHETICS VINYL, CALCITE
L240050	BT15C-CT1-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240051	BT15C-CT1-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240052	BT15C-CT1-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240053	BT15C-JC-01	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Q
Project Name: RAYMOND G. MURPHY VA, BLDG. T15C; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240054	BT15C-JC-02	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240055	BT15C-JC-03	WHITE, POWDERY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240056*	BT15C-MM-01	BLACK, TARRY HOMOGENEOUS (MIRROR MASTIC)		6-8% CHRYSOTILE	TAR
L240057	BT15C-MM-02	**NOT ANALYZED DUE TO POSITIVE STOP			
L240058	BT15C-MM-03	**NOT ANALYZED DUE TO POSITIVE STOP			
L240059	BT15C-PJC-01	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Q
Project Name: RAYMOND G. MURPHY VA, BLDG. T15C; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240060	BT15C-PJC-02	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
L240061	BT15C-PJC-03	WHITE, POWDERY NONHOM (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER
		WHITE, POWDERY (JOINT COMPOUND)		NONE DETECTED	CALCITE, QUARTZ, MICA, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24Qb
Project Name: RAYMOND G. MURPHY VA, BLDG. T15C; 1244.019C.00 ST002

Date Received: 10/13/2015
Date Analyzed: 10/13/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L242507	BT15C-RFM-01	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	5% CELLULOSE OTHER
L242508	BT15C-RFM-02	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	5% CELLULOSE OTHER
L242509	BT15C-RFM-03	WHITE, GUMMY HOMOGENEOUS (MASTIC)		NONE DETECTED	5% CELLULOSE OTHER
L242510	BT15C-CT2-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 35% MINERAL WOOL PERLITE, OTHER
L242511	BT15C-CT2-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 35% MINERAL WOOL PERLITE, OTHER
L242512	BT15C-CT2-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 35% MINERAL WOOL PERLITE, OTHER

Laboratory Manager

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Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24J
Project Name: RAYMOND G MURPHY VA, BLDG. T15D; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240071	BT15D-FT1-01	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240072	BT15D-FT1-02	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240073	BT15D-FT1-03	WHITE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240074	BT15D-FT2-01	GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24J
Project Name: RAYMOND G MURPHY VA, BLDG. T15D; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240075	BT15D-FT2-02	GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240076	BT15D-FT2-03	GREEN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L240077	BT15D-CT1-01	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240078	BT15D-CT1-02	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240079	BT15D-CT1-03	WHITE, FIBROUS HOMOGENEOUS (CEILING TILE)		NONE DETECTED	40% CELLULOSE 30% MINERAL WOOL PERLITE, OTHER
L240080	BT15D-CPM-01	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
Analysis results on this test report pertain only to those materials tested.
Disclaimers: Asbestos content is quantified using Calibrated Visual Estimate. PLM analysis has been known to be inaccurate for materials with low concentrations of asbestos. Negative PLM results cannot be guaranteed. LES recommends using TEM analysis for materials reported as <1% or none detected. This report may not be reproduced, except in full, without written approval by LES

Loflin Environmental Services, Inc. 2020 Montrose Blvd., Houston, Texas 77006
(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24J
Project Name: RAYMOND G MURPHY VA, BLDG. T15D; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240081	BT15D-CPM-02	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER
L240082	BT15D-CPM-03	YELLOW, CRUMBLY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24G
Project Name: RAYMOND G. MURPHY VA, BLDG. T60; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/02/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239738	T60 CPU -01	YELLOW, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	CALCITE, OTHER
L239739	T60 CPU -02	YELLOW, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	CALCITE, OTHER
L239740	T60 CPU -03	YELLOW, GUMMY HOMOGENEOUS (CARPET MASTIC)		NONE DETECTED	CALCITE, OTHER
L239741	T60 FT1 -01	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR
L239742	T60 FT1 -02	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24G
Project Name: RAYMOND G. MURPHY VA, BLDG. T60; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/02/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239743	T60 FT1 -03	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR
L239744	T60 FT1 -04	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR
L239745	T60 FT1 -05	BEIGE, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR
L239746	T60 FT2 -01	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24G
Project Name: RAYMOND G. MURPHY VA, BLDG. T60; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/02/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239747	T60 FT2 -02	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR, OTHER
L239748	T60 FT2 -03	PINK, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		BLACK, TARRY (MASTIC)		NONE DETECTED	5% CELLULOSE TAR, OTHER
L239749	T60 FT3 -01	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER
L239750	T60 FT3 -02	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24G
Project Name: RAYMOND G. MURPHY VA, BLDG. T60; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/02/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L239751	T60 FT3 -03	TAN, GRANULAR NONHOM (FLOOR TILE)		NONE DETECTED	CALCITE, VINYL, QUARTZ
		YELLOW, GUMMY (MASTIC)		NONE DETECTED	OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
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NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24O
Project Name: RAYMOND G MURPHY VA, BLDG. T72; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240065	BT72-JC -01	WHITE, GUMMY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	OTHER
L240066	BT72-JC -02	WHITE, GUMMY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	OTHER
L240067	BT72-JC -03	WHITE, GUMMY HOMOGENEOUS (JOINT COMPOUND)		NONE DETECTED	OTHER

Laboratory Manager

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Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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(713) 521-3300 Fax (713)523-0829

NVLAP 10-2044
TDH Lab 30-0031

Report of Bulk Sample Analysis For Asbestos Identification

Polarized Light Microscopy (PLM)
EPA 600/R-93/116, July 1994

Client: MECx, INC.
Client Address: 8864 INTERCHANGE DRIVE, HOUSTON, TX 77054
Project No: 750-15-24P
Project Name: RAYMOND G. MURPHY VA, BLDG, T74; 1244.019C.00 ST002

Date Received: 08/24/2015
Date Analyzed: 09/03/2015

Lab Number	Field Number	Sample Description (Components)	Sample Location	Asbestos Detected	Additional Constituents
L240062	BT74-DS -01	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	5% SYNTHETICS CALCITE, OTHER
L240063	BT74-DS -02	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	5% SYNTHETICS CALCITE, OTHER
L240064	BT74-DS -03	WHITE, GUMMY HOMOGENEOUS (SEALANT)		NONE DETECTED	5% SYNTHETICS CALCITE, OTHER

Laboratory Manager

*Asbestos-containing materials - The type and percentage of various fibrous components was determined by the microscopist in accordance with U.S. Environmental Protection Agency "Method For The Determination Of Asbestos In Bulk Samples" EPA/600/R-93/116, July 1993.
Departures from the test method: **None**
The above test report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MEC²
CONTACT: Matt Hoak
ADDRESS: 8864 Interchange
Houston TX 77054
PHONE/FAX:

LAB JOB: 750.15.24
CLIENT JOB: VA Albuquerque
DATE: 10/5/15
CLIENT PO: Building 41
ANALYSIS REQUESTED
☐ PLM ☐ POINTCOUNT ☐ PCM
TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242012	DS1-04	Duct Insulation Sealant
13	05	"
14	06	"
15	07	"
16	08	"
17	09	"
18	DS2-04	AHU Ins. Sealant
19	05	"
20	HWR-04	Heating Water Sealant
21	04A	"
22	06	"
23	RFS-01	Drain Sealant
24	02	"
25	03	"
26	DHW-01	Dom. Hot Sealant
27	02	"
28	CHW2-01	CHW Sealant
29	02	"
30	03	"
31	DS3-01	AHU Ins Sealant

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242032	CHWX-01	CHW Sealant
33	02	"
34	03	"
35	HWX-01	Heating W. Sealant
36	02	"
37	03	"
38	STMX-01	Steam Sealant
39	02	"
40	03	"
41	DS2X-01	AHU Ins Sealant
42	02	"
43	03	"
44	DS5X-01	Duct Seam Sealant
45	02	"
46	03	"

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE/TIME: Thru 10/5/15	RECEIVED BY: DATE/TIME: 10/6/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MEC
CONTACT: Matt Hoak
ADDRESS: 8864 Interchange
Houston TX 77054
PHONE/FAX:

LAB JOB: 750.15.24 Vb
DATE: 10/5/15
ANALYSIS REQUESTED
☐ PLM ☐ POINTCOUNT ☐ PCM

CLIENT JOB: VA Albuquerque
CLIENT PO: Building 43
TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242003	VNT.01	Vent Line Sealant
04	02	"
05	03	"
06	04	"
07	BP.01	By Pass Sealant
08	02	"
09	03	"
10	CON.03	Condensate Sealant
11	04	"
242047	05	

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: [signature] DATE/TIME: 10/5/15	RECEIVED BY: [signature] DATE/TIME: 10/6/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MEC²

CONTACT: Matt Haas

ADDRESS:

PHONE/FAX:

LAB JOB: 750·15·24Ab

CLIENT JOB: VA Albuquerque

DATE: 10/7/15 Bldg 41

CLIENT PO:

ANALYSIS REQUESTED
☐ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242489	RPS·04	Drain Sealant	3B±		
90	RPS·05	" "	4C±		

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE/TIME: 10/2/15	RECEIVED BY: DATE/TIME: 10/7/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MEC
CONTACT: Matt Hoak
ADDRESS: 8864 Interchange
Houston TX 77054
PHONE/FAX:

LAB JOB: 750.15.24
DATE: 10/5/15
ANALYSIS REQUESTED
☐ PLM ☐ POINTCOUNT ☐ PCM

CLIENT JOB: VA Albuquerque
CLIENT PO: Building 41
TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242012	DS1-04	Duct Insulation Sealant
13	05	
14	06	
15	07	
16	08	
17	09	
18	DS2-04	AHU Ins. Sealant
19	05	
20	HWR-04	Heating Water Sealant
21	04A	
22	06	
23	RFS-01	Drain Sealant
24	02	
25	03	
26	DHW-01	Dom. Hot Sealant
27	02	
28	CHW2-01	CHW Sealant
29	02	
30	03	
31	DS3-01	AHU Ins Sealant

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242032	CHWX-01	CHW Sealant
33	02	
34	03	
35	HWX-01	Heating W. Sealant
36	02	
37	03	
38	STMX-01	Steam Sealant
39	02	
40	03	
41	DS2X-01	AHU Ins Sealant
42	02	
43	03	
44	DSSX-01	Duct Seam Sealant
45	02	
46	03	

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE/TIME: 10/5/15	RECEIVED BY: DATE/TIME: 10/6/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MEC
CONTACT: Matt Hoak
ADDRESS: 3864 Interchange
Houston TX 77054
PHONE/FAX:

LAB JOB: 750.15.24 V6
DATE: 10/5/15
ANALYSIS REQUESTED
☐ PLM ☐ POINTCOUNT ☐ PCM

CLIENT JOB: VA Albuquerque
CLIENT PO: Building 43
TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
242003	VNT-01	Vent Line Sealant			
04	02	"			
05	03	"			
06	04	"			
07	BP-01	Bypass Sealant			
08	02	"			
09	03	"			
10	CON-03	Condensate Sealant			
11	04	"			
242047	05				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE/TIME: 10/5/15	RECEIVED BY: DATE/TIME: 10/6/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

24 PLM

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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24F
DATE: 8/24/15
CLIENT JOB: Raymond G. Murphy VA
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239752	B46 CT1-01	CT&G
53	B46 02	"
54	B46 03	"
55	B46 CT2-01	CT&G
56	B46 02	"
57	B46 03	"
58	B46 BS-01	Drywall Sealant
59	B46 02	"
60	B46 03	"
61	B46 CT3-01	CT&G
62	B46 02	"
63	B46 03	"
64	B46 JC-01	Joint Compound
65	B46 02	"
66	B46 03	"
67	B46 FT1-01	FT-M
68	B46 02	"
69	B46 03	"
70	B46 FT2-01	FT-M
71	B46 02	"

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239772	B46 FT2-03	FT-M
73	B46 RBM-01	Floor Mastic
74	B46 02	"
75	B46 03	"

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

14 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24G

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239738	T60 CPM-01	Cpl mastic			
39	T60 02	"			
40	T60 03	"			
41	T60 FT1-01	FT. M			
42	T60 02	"			
43	T60 03	"			
44	T60 04	"			
45	T60 05	"			
46	T60 FT2-01	FT. M			
47	T60 02	"			
48	T60 03	"			
49	T60 FT3-01	FT. M			
50	T60 F 02	"			
51	T60 03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24E
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239720	B42 JC-01	Jamb Comp.			
21	B42 02	"			
22	B42 03	"			
23	B42 GBX-01	Exhaust Fan			
24	B42 02	"			
25	B42 03	"			
26	B42 HW-01	HW Sealant			
27	B42 02	"			
28	B42 03	"			
29	B42 DW-01	DW Sealant			
30	B42 02	"			
31	B42 03	"			
32	B42 ST-01	Stucco			
33	B42 02	"			
34	B42 03	"			
35	B42 CLK-01	Caulk			
36	B42 02	"			
37	B42 03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC. 2020
MONTROSE - HOUSTON, TEXAS 77006

CLIENT: MECx

CONTACT: Matthew Haak

ADDRESS: Houston, TX

PHONE/FAX:

LAB JOB #: 750-15-24A

CLIENT JO Albuquerqua VA

DATE: 8/19/15

CLIENT P.C BUILDING 41

ANALYSIS REQUESTED
( ) PLM ( ) POINT COUNT ( ) PCM

TURNAROUND
( ) IMMEDIATE ( ) 24-HOUR ( ) 3-DAY ( ) OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239289	CHWS-01	CHW SUPPLY SEALANT
90	CHWS-02	CHW SUPPLY SEALANT
91	CHWS-03	CHW SUPPLY SEALANT
92	CHWR-01	CHW RETURN SEALANT
93	CHWR-02	CHW RETURN SEALANT
94	CHWR-03	CHW RETURN SEALANT
95	HWS-01	HW SUPPLY SEALANT
96	HWS-02	HW SUPPLY SEALANT
97	HWS-03	HW SUPPLY SEALANT
98	HWR-01	HW RETURN SEALANT
99	HWR-02	HW RETURN SEALANT
300	HWR-03	HW RETURN SEALANT
01	DWS-01	DOM. WATER SEALANT
02	DWS-02	DOM. WATER SEALANT
03	DWS-03	DOM. WATER SEALANT
04	FP1-01	SAFP
05	FP1-02	SAFP
06	FP1-03	SAFP
07	FP1-04	SAFP
08	FP1-05	SAFP
09	FP1-06	SAFP
10	FP1-07	SAFP
11	DS1-01	DUCT INS. SEALANT
12	DS1-02	DUCT INS. SEALANT
13	DS1-03	DUCT INS. SEALANT
14	DS2-01	AHU INS. SEALANT
15	DS2-02	AHU INS. SEALANT

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239316	DS2-03	AHU INS. SEALANT
17	GDS-01	GRAY DUCT SEALANT
16	GDS-02	GRAY DUCT SEALANT
17	GDS-03	GRAY DUCT SEALANT
20	STM-01	STAIR TREAD MASTIC
21	STM-02	STAIR TREAD MASTIC
22	STM-03	STAIR TREAD MASTIC
23	RDS-01	RED DUCT SEALANT
24	RDS-02	RED DUCT SEALANT
25	RDS-03	RED DUCT SEALANT
26	FSP-01	FIRESTOP PLASTER
27	FSP-02	FIRESTOP PLASTER
28	FSP-03	FIRESTOP PLASTER
29	RFS-01	RED FIRESTOP
30	RFS-02	RED FIRESTOP
31	RFS-03	RED FIRESTOP
32	WV1-01	WOODY VINYL 4"
33	WV1-02	WOODY VINYL 4"
34	WV1-03	WOODY VINYL 4"
35	WV2-01	WOODY VINYL 5"
36	WV2-02	WOODY VINYL 5"
37	WV2-03	WOODY VINYL 5"
38	STC-01	EXTERIOR STUCCO
39	STC-02	EXTERIOR STUCCO
40	STC-03	EXTERIOR STUCCO
41	CB1-01	COVE BASE MASTIC
42	CB1-02	COVE BASE MASTIC

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY:	RECEIVED BY:
DATE / TIME:	DATE / TIME: 8/21/15
RELINQUISHED BY:	RECEIVED BY:
DATE / TIME:	DATE / TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC. 2020
MONTROSE - HOUSTON, TEXAS 77006

CLIENT: MECx

CONTACT: Matthew Haak

ADDRESS: Houston, TX

PHONE/FAX:

LAB JOB #: 750-15-

CLIENT JO Albuquerqua VA

DATE: 8/19/15

CLIENT P.C **BUILDING 41**

ANALYSIS REQUESTED
( ) PLM ( ) POINT COUNT ( ) PCM

TURNAROUND
( ) IMMEDIATE ( ) 24-HOUR ( ) 3-DAY ( ) OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239343	CB1-03	COVE BASE MASTIC
44	JC-01	JOINT COMPOUND
45	JC-02	JOINT COMPOUND
46	JC-03	JOINT COMPOUND
47	JC-04	JOINT COMPOUND
48	JC-05	JOINT COMPOUND
49	JC-06	JOINT COMPOUND
50	JC-07	JOINT COMPOUND
51	JC-08	JOINT COMPOUND
52	JC-09	JOINT COMPOUND
53	JC-10	JOINT COMPOUND
54	JC-11	JOINT COMPOUND
55	JC-12	JOINT COMPOUND
56	JC-13	JOINT COMPOUND
57	JC-14	JOINT COMPOUND
58	JC-15	JOINT COMPOUND
59	JC-16	JOINT COMPOUND
60	JC-17	JOINT COMPOUND
61	JC-18	JOINT COMPOUND
62	JC-19	JOINT COMPOUND
63	JC-20	JOINT COMPOUND
64	JC-21	JOINT COMPOUND
65	JC-22	JOINT COMPOUND
66	JC-23	JOINT COMPOUND
67	JC-24	JOINT COMPOUND
68	JC-25	JOINT COMPOUND
69	JC-26	JOINT COMPOUND

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239370	FT1-01	BEIGE FT/M
71	FT1-02	BEIGE FT/M
72	FT1-03	BEIGE FT/M
73	FT1-04	BEIGE FT/M
74	FT1-05	BEIGE FT/M
75	FT1-06	BEIGE FT/M
76	FT1-07	BEIGE FT/M
77	FT1-08	BEIGE FT/M
78	FT1-09	BEIGE FT/M
79	FT1-10	BEIGE FT/M
80	FT1-11	BEIGE FT/M
81	FT1A-01	GRAY FT/M
82	FT1A-02	GRAY FT/M
83	FT1A-03	GRAY FT/M
84	FT1A-04	GRAY FT/M
85	FT1A-05	GRAY FT/M
86	FT1A-06	GRAY FT/M
87	FT1A-07	GRAY FT/M
88	FT2-01	FT/M
89	FT2-02	FT/M
90	FT2-03	FT/M
91	FT2-04	FT/M
92	FT3-01	FT/M
93	FT3-02	FT/M
94	FT3-03	FT/M
95	FT3-04	FT/M
96	FT3-05	FT/M

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE / TIME:	RECEIVED BY: DATE / TIME:
RELINQUISHED BY: DATE / TIME:	RECEIVED BY: DATE / TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC. 2020
MONTROSE - HOUSTON, TEXAS 77006

CLIENT: MECx

CONTACT: Matthew Haak

ADDRESS: Houston, TX

PHONE/FAX:

LAB JOB #: 750-15-

DATE: 8/19/15

CLIENT JO Albuquerqua VA

CLIENT P.C BUILDING 41

ANALYSIS REQUESTED
( ) PLM ( ) POINT COUNT ( ) PCM

TURNAROUND
( ) IMMEDIATE ( ) 24-HOUR ( ) 3-DAY ( ) OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239397	FT3-06	FT/M
96	FT5-01	FT/M
99	FT5-02	FT/M
400	FT5-03	FT/M
01	FT6-01	FT/M
02	FT6-02	FT/M
03	FT6-03	FT/M
04	FT7-01	FT/M
05	FT7-02	FT/M
06	FT7-03	FT/M
07	FT8-01	FT/M
08	FT8-02	FT/M
09	FT8-03	FT/M
10	FT9-01	FT/M
11	FT9-02	FT/M
12	FT9-03	FT/M
13	FT10-01	FT/M
14	FT10-02	FT/M
15	FT10-03	FT/M
16	FT11-01	FT/M
17	FT11-02	FT/M
18	FT11-03	FT/M
19	FT12-01	FT/M
20	FT12-02	FT/M
21	FT12-03	FT/M
22	CT1-01	2X4 CT
23	CT1-02	2X4 CT

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239424	CT1-03	2X4 CT
25	CT1-04	2X4 CT
26	CT1-05	2X4 CT
27	CT1-06	2X4 CT
28	CT1-07	2X4 CT
29	CT2-01	2X2 CT
30	CT2-02	2X2 CT
31	CT2-03	2X2 CT
32	CT2-04	2X2 CT
33	CT2-05	2X2 CT
34	CT2-06	2X2 CT
35	CT2-07	2X2 CT
36	CT3-01	2X2 CT
37	CT3-02	2X2 CT
38	CT3-03	2X2 CT
39	CT4-01	2X2 CT
40	CT4-02	2X2 CT
41	CT4-03	2X2 CT
42	CT5-01	2X4 CT
43	CT5-02	2X4 CT
44	CT5-03	2X4 CT
45	CT6-01	2X4 CT
46	CT6-02	2X4 CT
47	CT6-03	2X4 CT
48	CT7-01	2X4 CT
49	CT7-02	2X4 CT
50	CT7-03	2X4 CT

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: DATE / TIME:	RECEIVED BY: DATE / TIME:
RELINQUISHED BY: DATE / TIME:	RECEIVED BY: DATE / TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC. 2020
MONTROSE - HOUSTON, TEXAS 77006

CLIENT: MECx

CONTACT: Matthew Haak

ADDRESS: Houston, TX

PHONE/FAX:

LAB JOB #: 750-15-

CLIENT JO Albuquerqua VA

DATE: 8/19/15

CLIENT P.C BUILDING 41

ANALYSIS REQUESTED
( ) PLM ( ) POINT COUNT ( ) PCM

TURNAROUND
( ) IMMEDIATE ( ) 24-HOUR ( ) 3-DAY ( ) OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239451	CPM-01	CARPET MASTIC			
52	CPM-02	CARPET MASTIC			
53	CPM-03	CARPET MASTIC			
54	CPM-04	CARPET MASTIC			
55	CPM-05	CARPET MASTIC			
56	CPM-06	CARPET MASTIC			
57	SV1-01	SHEET VINYL			
58	SV1-02	SHEET VINYL			
59	SV2-01	SHEET VINYL			
60	SV2-02	SHEET VINYL			
61	SV2-03	SHEET VINYL			
62	SV3-01	SHEET VINYL			
63	SV3-02	SHEET VINYL			
64	SV4-01	SHEET VINYL			
65	SV4-02	SHEET VINYL			
66	SV4-03	SHEET VINYL			
67	SV5-01	SHEET VIMYL			
239486	RFS-04	Red Firestop			
87	05	"			
88	[illegible]-04	HW Sealant			
89	JC-27	Joint Compound			
90	FP1-07	fireproofing			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY:	RECEIVED BY:
DATE / TIME:	DATE / TIME:
RELINQUISHED BY:	RECEIVED BY:
DATE / TIME:	DATE / TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
240641	B43 CHW.01	Sealant
42	02	"
43	03	"
44	CHEM.01	Sealant
45	02	
46	03	
47	DW.01	Sealant
48	SHB.01	Insulation
49	EPG.01	Gasket
50	FT1.01	FT. M
51	02	|
52	03	|
53	04	|
54	05	|
55	CT1.01	C. Tile
56	02	"
57	03	"
58	JC.01	Joint Compound
59	02	"
60	03	"

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
240661	B43.JC.04	Joint Compound
62	05	.
63	STK.01	Stucco
64	02	"
65	03	"
66		

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 V B43

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
24001	B43-BFW-01	Insulation	24021	DRN 01	Insulation
02	02	"	22	02	"
03	03	"	23	03	"
04	04	"	24	04	"
05	05	"	25	CON-01	Insulation
06	06	"	26	02	"
07	BFWT-01	Insulation	27	SHS-01	Sealant
08	02	"	28	02	"
09	03	"	29	03	"
10	BD-01	Insulation	30	PLC-01	Coating
11	02	"	31	02	"
12	03	"	32	03	"
13	04	"	33	CF-01	Insulation
14	05	"	34	02	"
15	LPS-01	Insulation	35	03	"
16	02	"	36	HW-01	Insulation
17	03	"	37	02	"
18	MPS-01	Insulation	38	CTNK-01	Insulation
19	02	"	39	02	"
20	03	"	40	03	"

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

15 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-245 B50
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
80	B50-CT1-01	C Tile			
81	02	"			
82	03	"			
83	FT1-01	FT-M			
84	02	"			
85	03	"			
86	JC-01	Joint Comp			
87	02	"			
88	03	"			
89	WV1-01	Vinyl Flooring			
90	02	"			
91	03	"			
92	FT2-01	FT-M			
93	02	"			
94	03				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

lab PLM

CLIENT: MECX, Inc
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24a (B10)
DATE: 8/24/15
CLIENT JOB: Raymond G. Murphy VA
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
240215	B10-FT1-01	F.T.W.
16	02	"
17	03	"
18	04	"
19	05	"
20	CT1-01	C. Tile
21	02	"
22	03	"
23	04	"
24	05	"
25	STM-01	Insulation
26	02	"
27	03	"
28	04	"
29	GPS-01	Insulation
30	02	"
31	SV1-01	Sheet vinyl
32	02	"
33	03	"
34	RFS-01	firestop
240235		
B50 RFS-02	B50-RFS-02	firestop
36 03	03	"
37	MPSN-01	Sealant
38	CHWN01	Sealant
39	WC-01	window caulk
40	02	"
41	03	"
42	STC-01	Stucco
43	02	"
44	03	"
45	SV2-01	Sheet vinyl
46	LCT-01	Countertop
47	CT2-01	C. Tile
48	02	"
49	03	"
50	CBM01	Cove Base Mastic
51	02	"
52	03	"
53	JC-01	Joint Compound
54	02	

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24 & 810
DATE: 8/24/15
CLIENT JOB: Raymond G. Murphy VA
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
240555	B10 JC-03	Joint Compound
56	04	"
57	05	"
58	FT2.01	FT. M
59	02	"
60	03	"
61	HW.01	Sealant
62	02	"
63	03	"
64	04	"
65	DW.01	Sealant
66	03	"
67	03	"
68	GD5.01	Duct Sealant
69	02	"
70	03	"
71	CHWS.01	Sealant
72	02	"
73	03	"
74	CHWR.01	Sealant
240575	B10 CHWR.02	Sealant
76	03	"
77	MPS.01	Sealant
78	02	"
79	03	"
240506	HW-05	

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

6 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 T B43A

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
410209	B43A-PSO-01	Textured			
10	02	"			
11	03	"			
12	STC-01	Stucco			
13	02	"			
14	03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 BS3

DATE: 8/24/15

CLIENT JOB: Raymond G. Murphy VA

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239853	BS3 DW.01	Sealant
54	BS3 02	"
55	BS3 03	"
56	BS3 HW.01	Sealant
57	BS3 02	"
58	BS3 03	"
59	BS3 CHW.01	Sealant
60	BS3 02	"
61	BS3 03	"
62	BS3 CT1.01	C.T.B
63	BS3 02	
64	BS3 03	
65	BS3 RFS.01	Finishop
66	BS3 02	"
67	BS3 03	"
68	BS3 FT1.01	F.T.M
69	BS3 02	"
70	BS3 03	"
71	BS3 JC.01	Joint Comp
72	BS3 . 02	.

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239873	BS3 JC-03	Joint Comp
74	BS3 JC.04	
75	BS3 JC-01	
76	BS3 WV1.01	Vinyl flooring
77	BS3 02	"
78	BS3 03	

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239852	B56 FT1 01	Ft. M	~~B56 STC 03~~ 239854	B56 STC 03	Stucco
33	B56 02	"			
34	B56 03	"			
35	B56 CT1 01	C.T.C.			
36	B56 02	"			
37	B56 03	"			
38	B56 CT2 01	C.T.C.			
39	B56 02	"			
40	B56 03	"			
41	B56 JC 01	JC			
42	B56 02	"			
43	B56 03	"			
44	B56 RPM 01	Cpd Mortar			
45	B56 02	"			
46	B56 03	"			
47	B56 FT2 01	Ft. M			
48	B56 02	"			
49	B56 03	"			
50	B56 STC 01	Stucco			
51	B56 02	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-24D
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
939706	BS4 FT1.01	FT. M			
07	BS4 " 02	"			
08	BS4 " 03	"			
09	BS4 CT1.01	C.T.C			
10	BS4 " 02	"			
11	BS4 " 03	"			
12	BS4 FS.01	fireStop			
13	BS4 " 02	"			
14	BS4 " 03	"			
15	BS4 CPM.01	Cpl Mastic			
16	BS4 " 02	"			
17	BS4 " 03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24C

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
239683	B52-FT-01	FT. W	239703	B52-CW-01	CW Sealant
84	B52 " 02	"	04	02	"
85	B52 " 03	"	05	03	"
86	B52 CT-01	C T.C.			
87	B52 " 02	"			
88	B52 " 03	"			
89	B52 JC-01	Joint Compound			
90	B52 02	"			
91	B52 03	"			
92	B52 04	"			
93	B52 05	"			
94	B52 HW-01	HW Sealant			
95	B52 02	"			
96	B52 03	"			
97	B52 FS-01	Firestop			
98	B52 " 02	"			
99	B52 " 03	"			
200	B52-VV-01	Floor Vinyl			
01	B52 02	"			
02	B52 03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24B

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
289647	BSS FH1 01	FH-M			
48	BSS 02	"			
49	BSS 03				
50	BSS CT1 01	CT-Ce			
51	BSS 02				
52	BSS 03	"			
53	BSS RFS.01	fire stop			
54	BSS 02				
55	BSS 03	"			
56	BSS Cpm 01	Cpt Mastic			
57	BSS 02				
58	BSS 03	"			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24(Q)6

CLIENT JOB: Raymond G. Murphy VA

DATE: 10-12-15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
24250[7]	BT15C-RFM-01	Matrix			
08	BT15C-RFM-02	↓			
09	BT15C-RFM-03	↓			
10	BT15C-CT2-01	CT			
11	BT15C-CT2-02	↓			
12	BT15C-CT2-03	↓			

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME: 10-12-15	RECEIVED BY: DATE/TIME: 10/13/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

12 PLM

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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 J

DATE: 8/24/15 T15D

CLIENT JOB: Raymond G. Murphy VA

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
24071	BT15D-FT1-01	FT. My
72	FT1-02	"
73	FT1-03	
74	FT2-01	FT. M
75	02	"
76	03	
77	CT1-01	C. T. G
78	02	"
79	03	"
80	CPM-01	Cpt. Mastic
81	02	"
82	03	

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

3 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 N B67A

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
2400568	B67A-SC-01	JC			
69	02	↓			
70	03				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

3 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-240 BT72

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
2150165	BT72-TC-01	T. Compound
166	02	1
167	03	

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

3 PLM

LOFLIN

ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-249 T74

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
2H00602	BT74-DS-01	Sealant			
603	02	1			
604	03				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

15 PLM

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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24 Q TISC

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
25047	BTISC-WV1-01	Floor Vinyl			
48	02	"			
49	03	"			
50	CT1-01	C. Tile			
51	02	"			
52	03	"			
53	JC-01	Joint Compound			
54	02	"			
55	03	"			
56	MM-01	Mirror Mastic			
57	02	"			
58	03	"			
59	PJC-01	Joint Compound			
60	02	"			
61	03				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak
DATE/TIME:

RECEIVED BY:
DATE/TIME: 8/24/15

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

LOFLIN
ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc
CONTACT: Matthew Haak
ADDRESS: 8864 Interchange Drive
Houston, TX 77054
PHONE/FAX:

LAB JOB: 750-15-246 B66
CLIENT JOB: Raymond G. Murphy VA
DATE: 8/24/15
CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
240038	B66-FT1.01	FT. 1			
39	02	1			
40	03				
41	CT1.01	C.T. 1			
42	02	1			
43	03				
44	JC.01	Joint Compound			
45	02	1			
46	03				

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

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ENVIRONMENTAL SERVICES, INC.
2020 MONTROSE - HOUSTON, TX 77006

CLIENT: MECX, Inc.

CONTACT: Matthew Haak

ADDRESS: 8864 Interchange Drive

Houston, TX 77054

PHONE/FAX:

LAB JOB: 750-15-24M B67

CLIENT JOB: Raymond G. Murphy VA

DATE: 8/24/15

CLIENT PO: 1244.019C.00 ST002

ANALYSIS REQUESTED
☒ PLM ☐ POINTCOUNT ☐ PCM

TURNAROUND
☐ IMMEDIATE ☐ 24-HOUR ☐ 3-DAY ☐ OTHER

LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION	LAB NUMBER	FIELD NUMBER	SAMPLE DESCRIPTION
24002 6	B67 · FT1.01	FT. M			
27	02	"			
28	03	"			
29	SV1.01	Sheet Vinyl			
30	02	"			
31	03	"			
32	CT1.01	C. Tile			
33	02	"			
34	03	"			
35	JC.01	Joint Comp.			
36	02	"			
37	03	"			
~~38~~					

CHAIN OF CUSTODY SIGNATURE

RELINQUISHED BY: Matt Haak DATE/TIME:	RECEIVED BY: DATE/TIME: 8/24/15
RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:

APPENDIX C
MEC^{X}'S CONSULTANT AGENCY LICENSE

TEXAS DEPARTMENT OF STATE HEALTH SERVICES

MECX INC

is certified to perform as a

Asbestos Consultant Agency

in the State of Texas within the purview of Texas Occupations Code, chapter 1954, so long as this license is not suspended or revoked and is renewed according to the rules adopted by the Texas Board of Health.

KIRK COLE, INTERIM
COMMISSIONER OF HEALTH

License Number: 100505

Expiration Date: 10/9/2017

Control Number: 96825

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

APPENDIX D
PHOTOGRAPHS

Building 10

1. Basement Mechanical Room Asbestos TSI.

2. Asbestos Containing TSI Above Crawl Space Access Door.

3. Asbestos Containing TSI Crawl Space.

4. Asbestos Containing TSI Old Building 10 Penthouse Mechanical Room.

Building 41

1. Penthouse Mechanical Room Asbestos TSI.

2. Asbestos Containing TSI Sealant Mechanical Systems Connecting To The Air Handler.

3. Asbestos Containing Dust Insulation Sealant Return Air Side.

4. Photograph Asbestos Warning Placard Posted In The Mechanical Rooms.

5. Basement Mechanical Room Asbestos Containing TSI Sealant.

6. Basement Mechanical Room Asbestos Containing TSI Sealant.

7. Basement Mechanical Room Asbestos Containing TSI Sealant..

8. Basement Mechanical Room Asbestos Containing TSI Sealant..

9. Interstitial Space HVAC Duct Insulation Asbestos Containing Sealant.

10. Interstitial Space HVAC Duct Insulation Asbestos Containing Sealant.

11. Basement Mechanical Room Asbestos Containing TSI Sealant..

12. Basement Mechanical Room Asbestos Containing TSI Sealant..

Building 43

1. Mezzanine Medium & Low Pressure Steam Asbestos TSI Sealant.

2. Mezzanine Medium & Low Pressure Steam Asbestos TSI Sealant.

3. Mezzanine Medium & Low Pressure Steam Asbestos TSI Sealant.

4. Boiler Feed Water Lines Asbestos TSI Sealant.

5. Boiler Feed Water Lines Asbestos TSI Sealant.

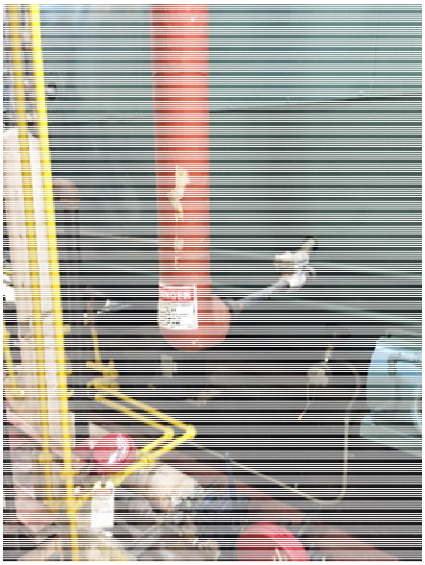
6. Boiler Feed Water Lines Asbestos TSI Sealant.

7. Boiler Blow Down Line Asbestos TSI Sealant

8. High Pressure Steam Header Asbestos TSI Sealant.

Building 43

9. Interstitial Space HVAC Duct Insulation Asbestos Containing Sealant.



10. Basement Chemical Feed Line Asbestos Containing TSI Sealant.

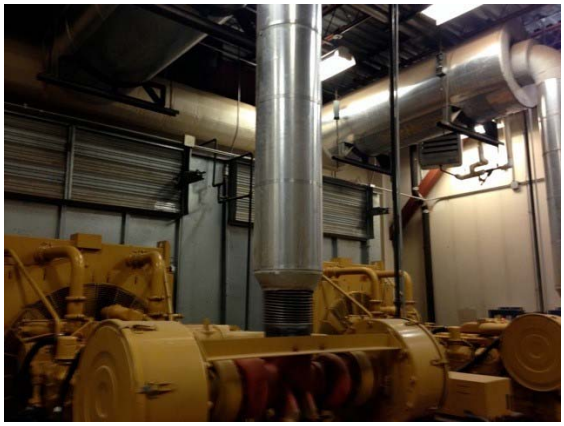
11. Basement Condensate Tank Asbestos Containing TSI Sealant.

12. Condensate Lines Asbestos Containing TSI Sealant.

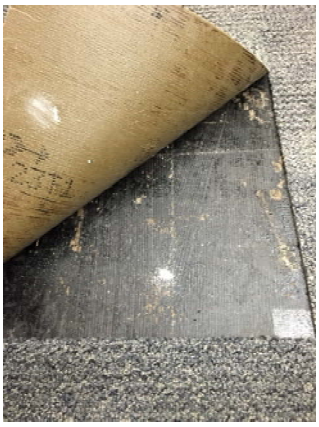
Building 43

 9. Vent Line Insulation Asbestos Containing Sealant.	10.
11.	12.

Building 42

 1. Emergency Generator Exhaust Line Asbestos Containing Insulation Mastic/Sealant.	 2. Domestic Water Line Insulation Mastic / Sealant.
3..	4.

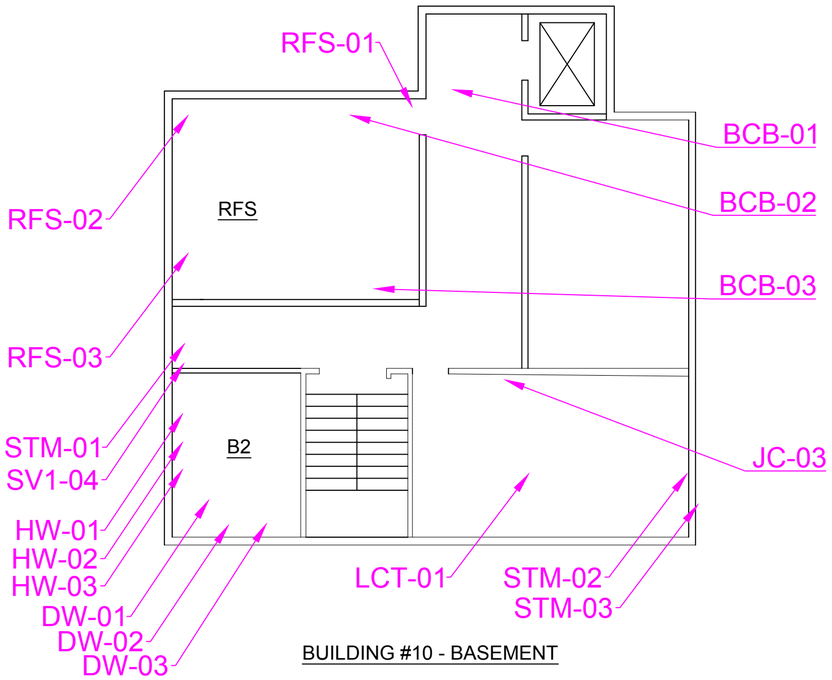
Building 46

 1. Asbestos Containing Floor Tile Mastic Beneath Floor Tile.	 2. Asbestos Containing Floor Mastic Beneath Carpet.
3..	4..

Building T15C

 1. Asbestos Containing Mirror Mastic Behind Mirror.	2.
3..	4..

APPENDIX E
FIGURES



BUILDING #10 - BASEMENT

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

WWW.MECX.NET

OTHER OFFICES:

CHICAGO, IL

DENVER, CO

A SERVICE-DISABLED VETERAN OWNED SMALL BUSINESS

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PROFESSIONAL SEALS:

INTERIM REVIEW ONLY

PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

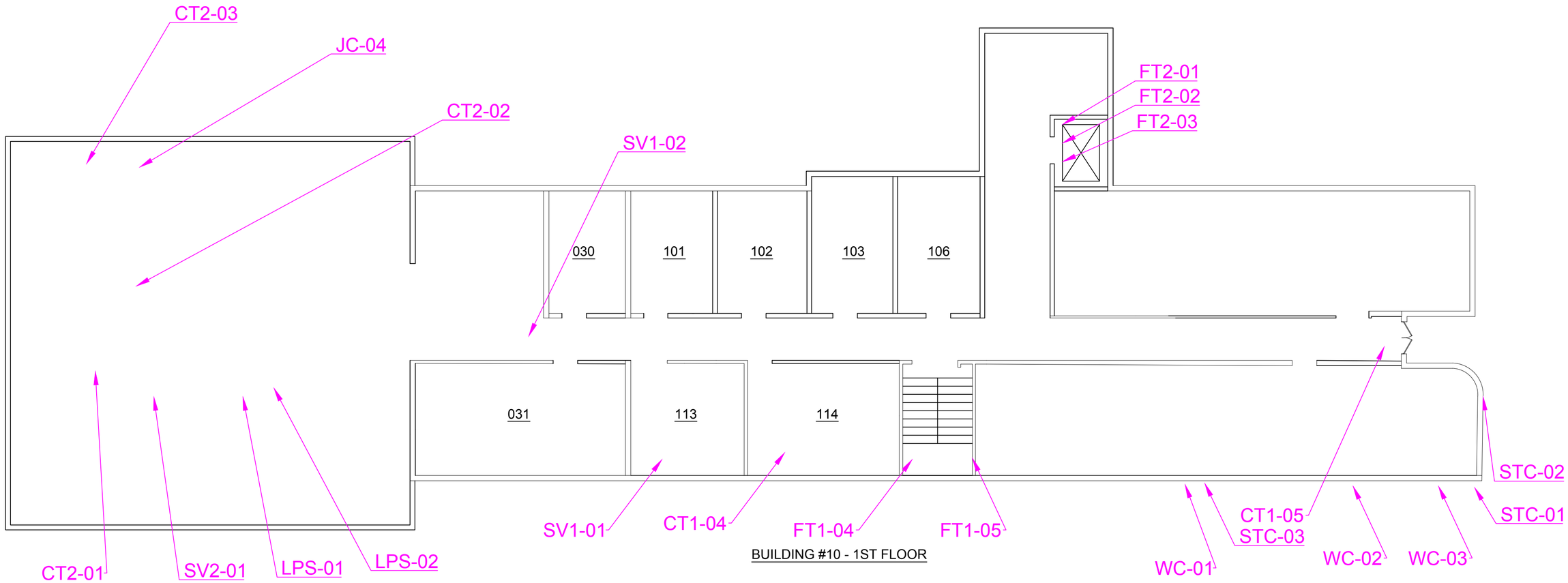
BUILDING 10
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA10-B



BUILDING #10 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 10
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

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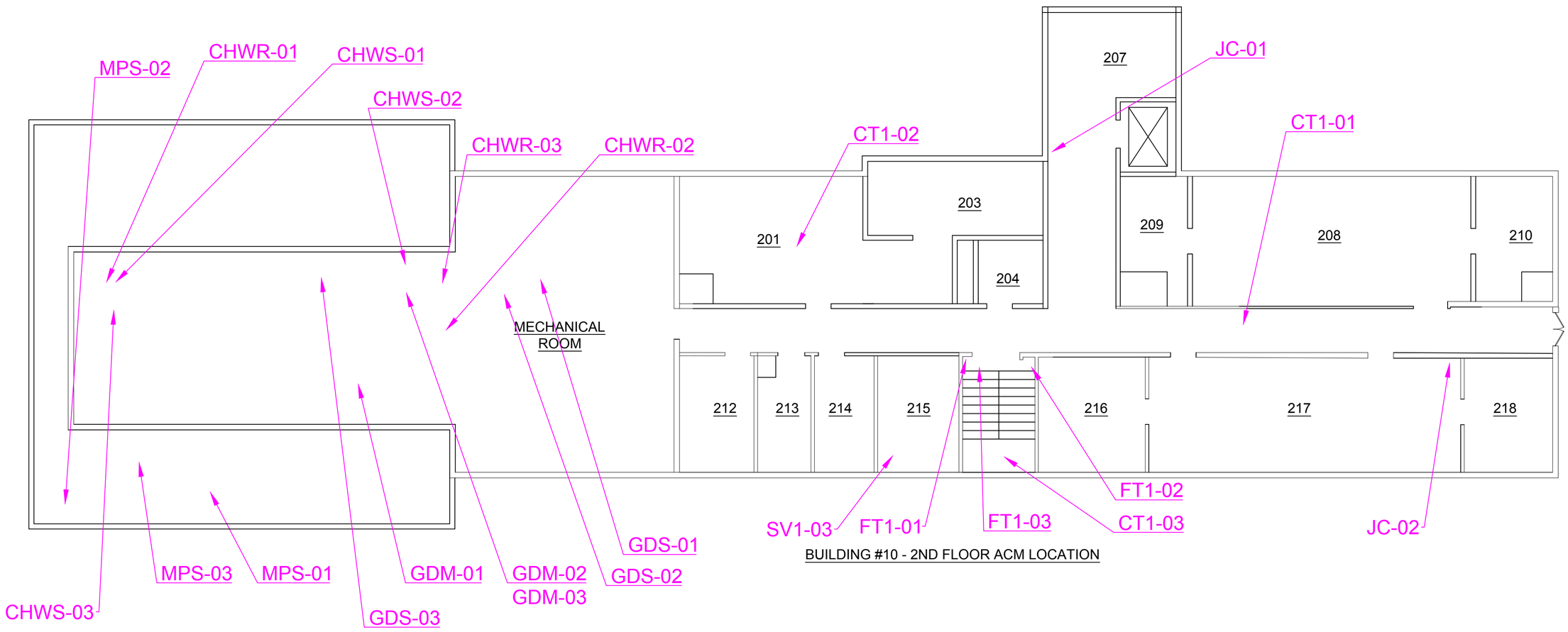
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA10-1.0



BUILDING #10 - 2ND FLOOR ACM LOCATION

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 10
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
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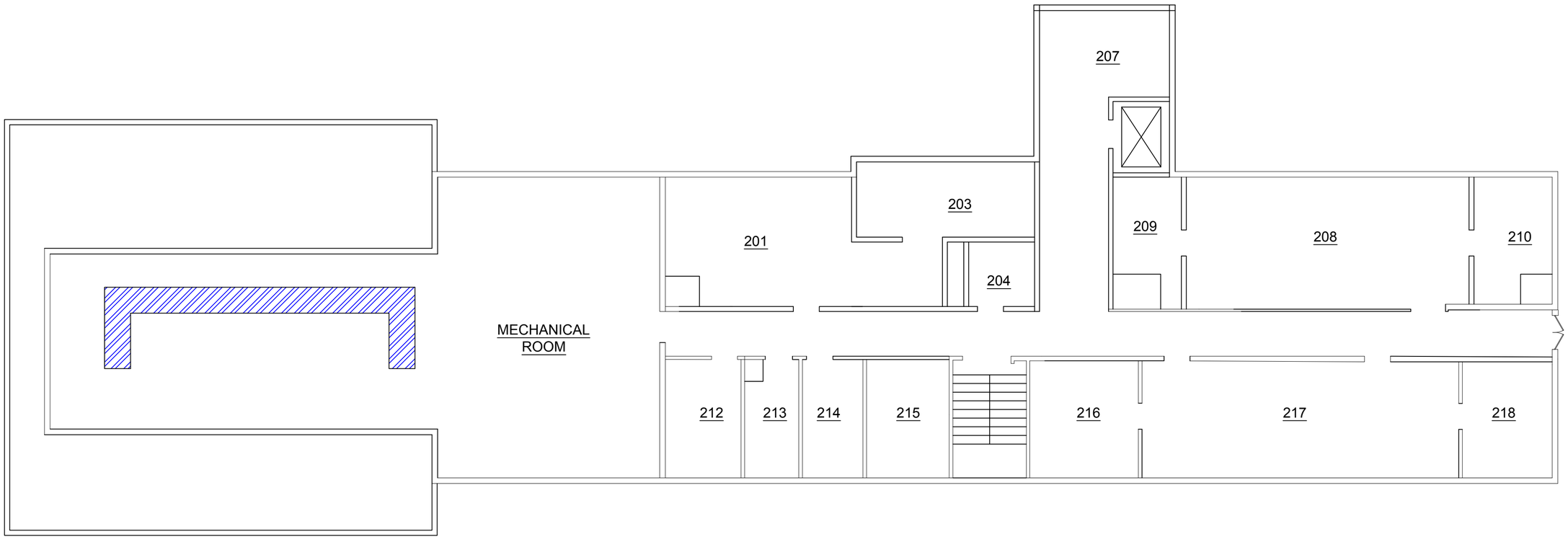
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA10-2.0



BUILDING #10 - 2ND FLOOR ACM LOCATION

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 20

GRAPHICAL SCALE (FT)

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

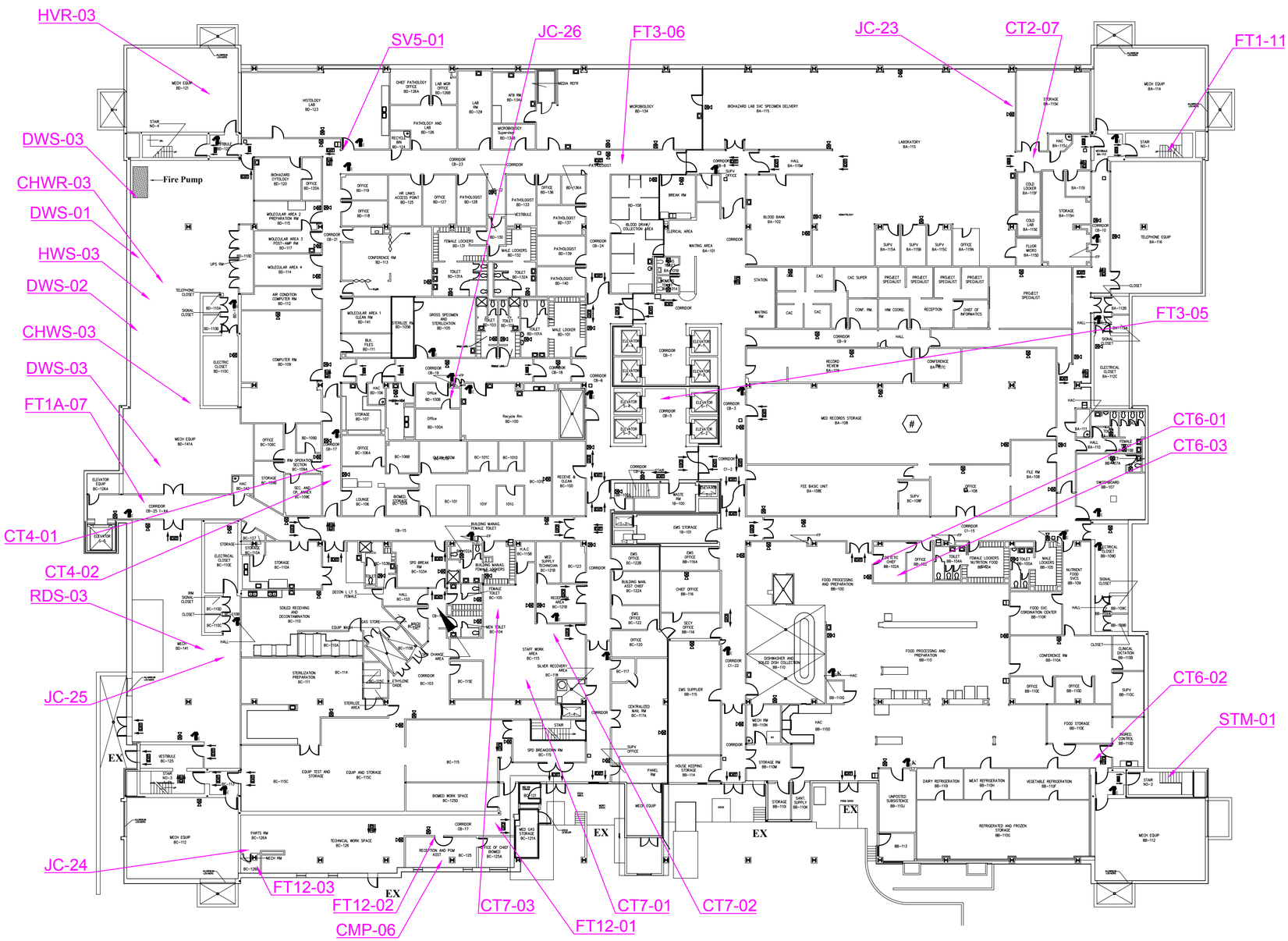
BUILDING 10
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA10-2.0-AL



BUILDING 41 - BASEMENT

LEGEND

CLK-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

MEC^X

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

WWW.MECX.NET

OTHER OFFICES:

CHICAGO, IL

DENVER, CO

SDVOSB

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

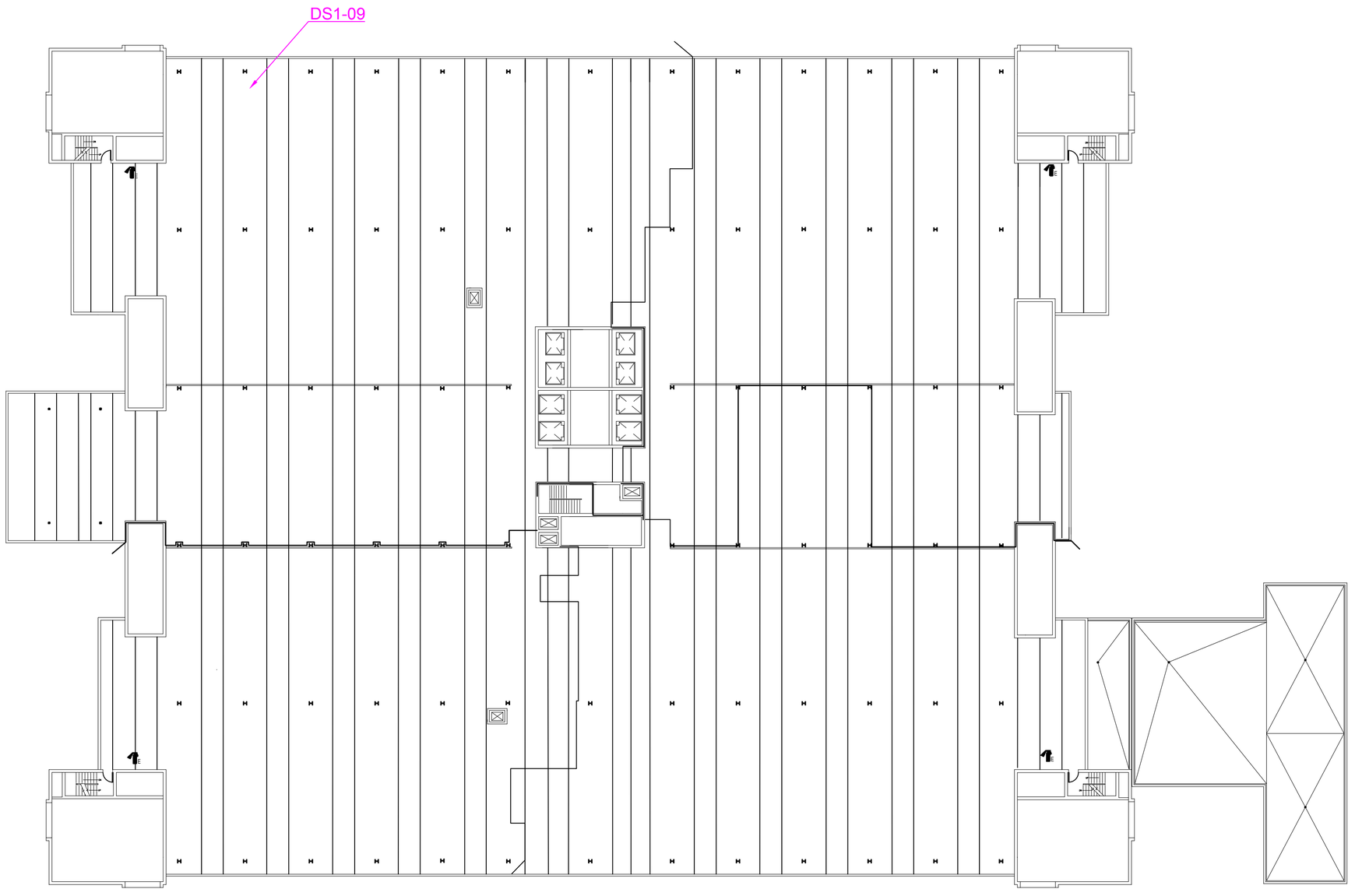
BUILDING 41
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-B



BUILDING 41 - INTERSTITIAL 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30
GRAPHICAL SCALE (FT)

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

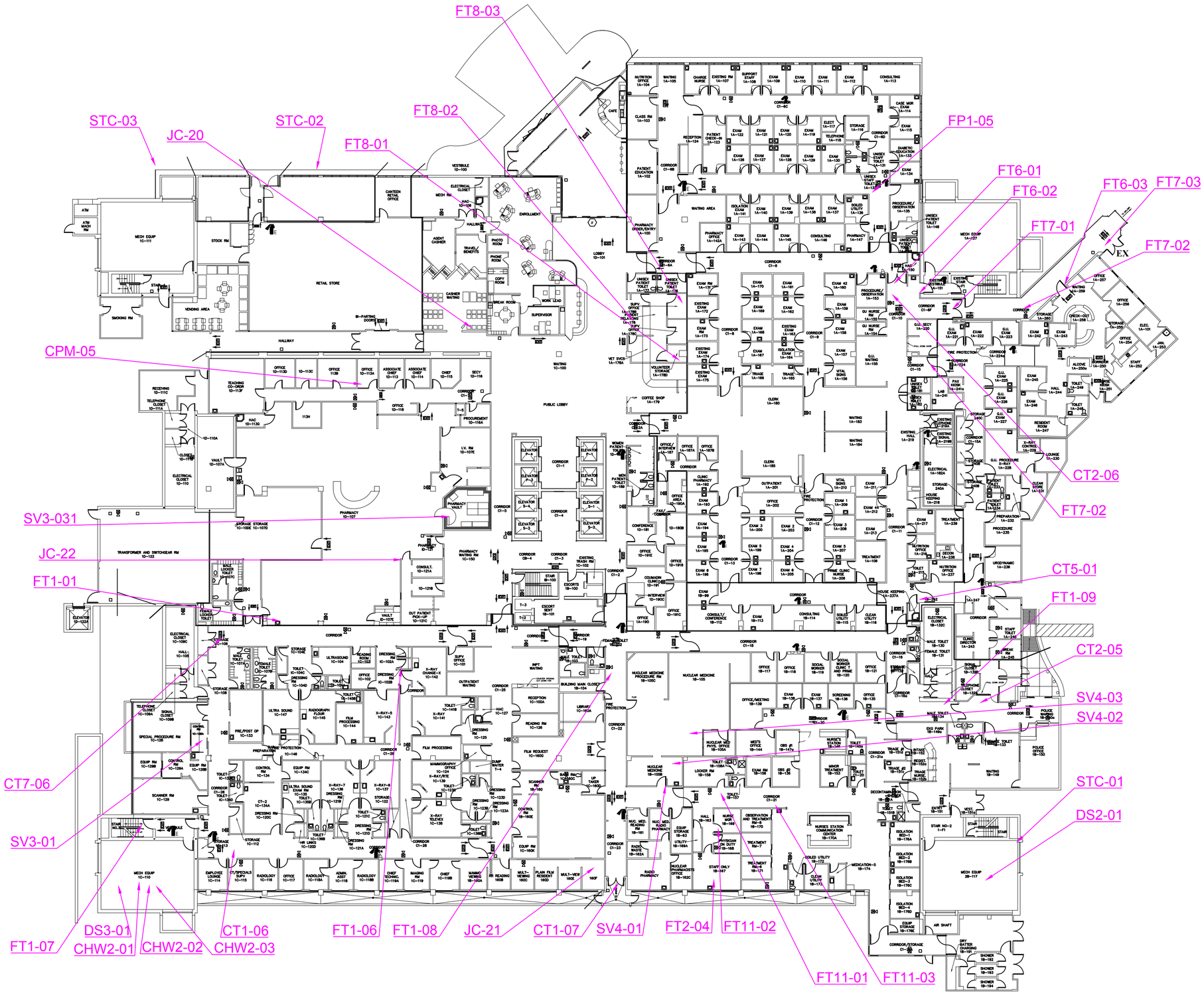
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-B.1



BUILDING 41 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

MEC^X

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8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

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PROJECT:

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

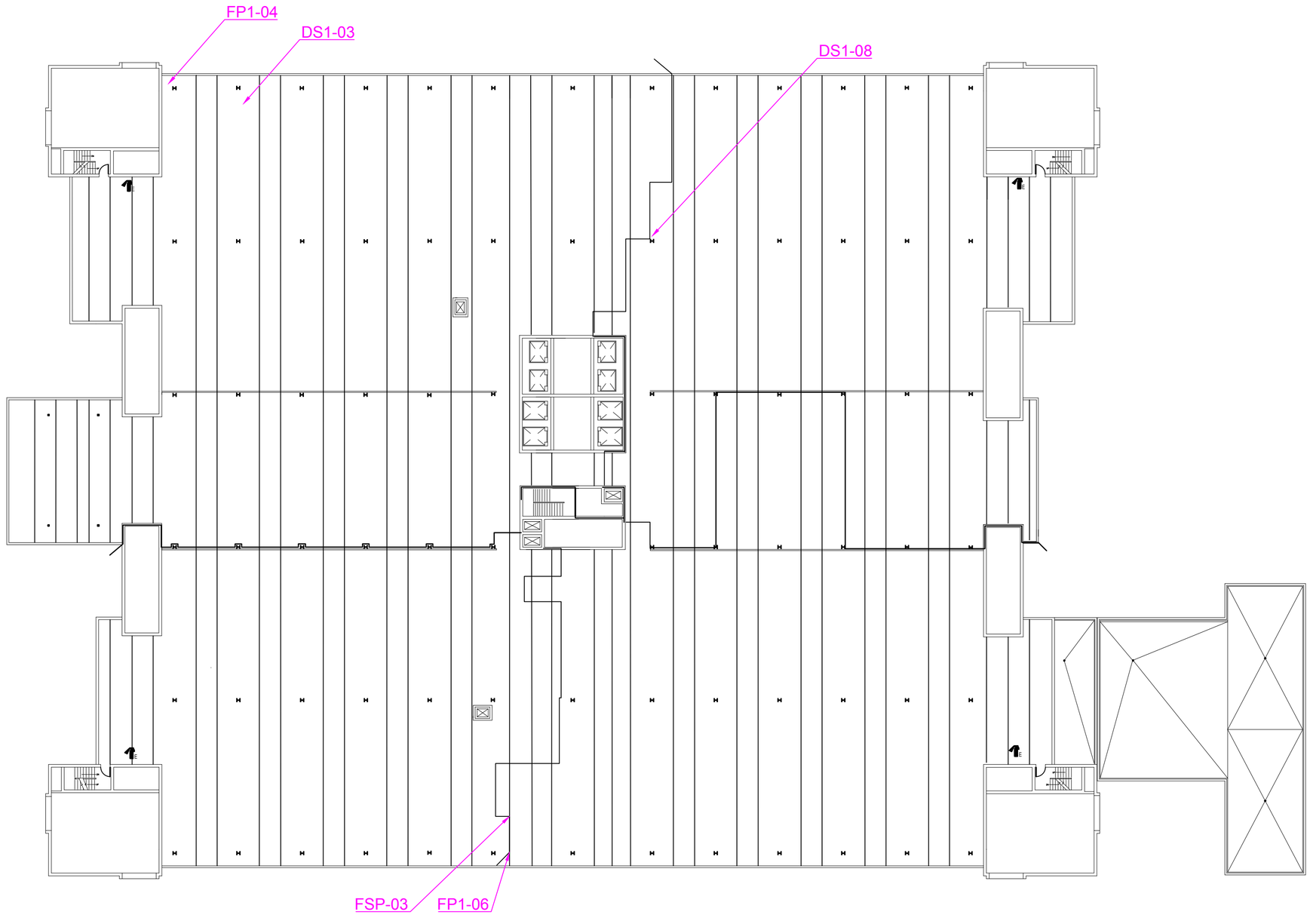
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-1.0



BUILDING 41 - INTERSTITIAL 2ND FLOOR

LEGEND

CS-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-1.1

BUILDING 41 - 2ND FLOOR

LEGEND

CT-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
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ALBUQUERQUE, NM 87108

SHEET TITLE:

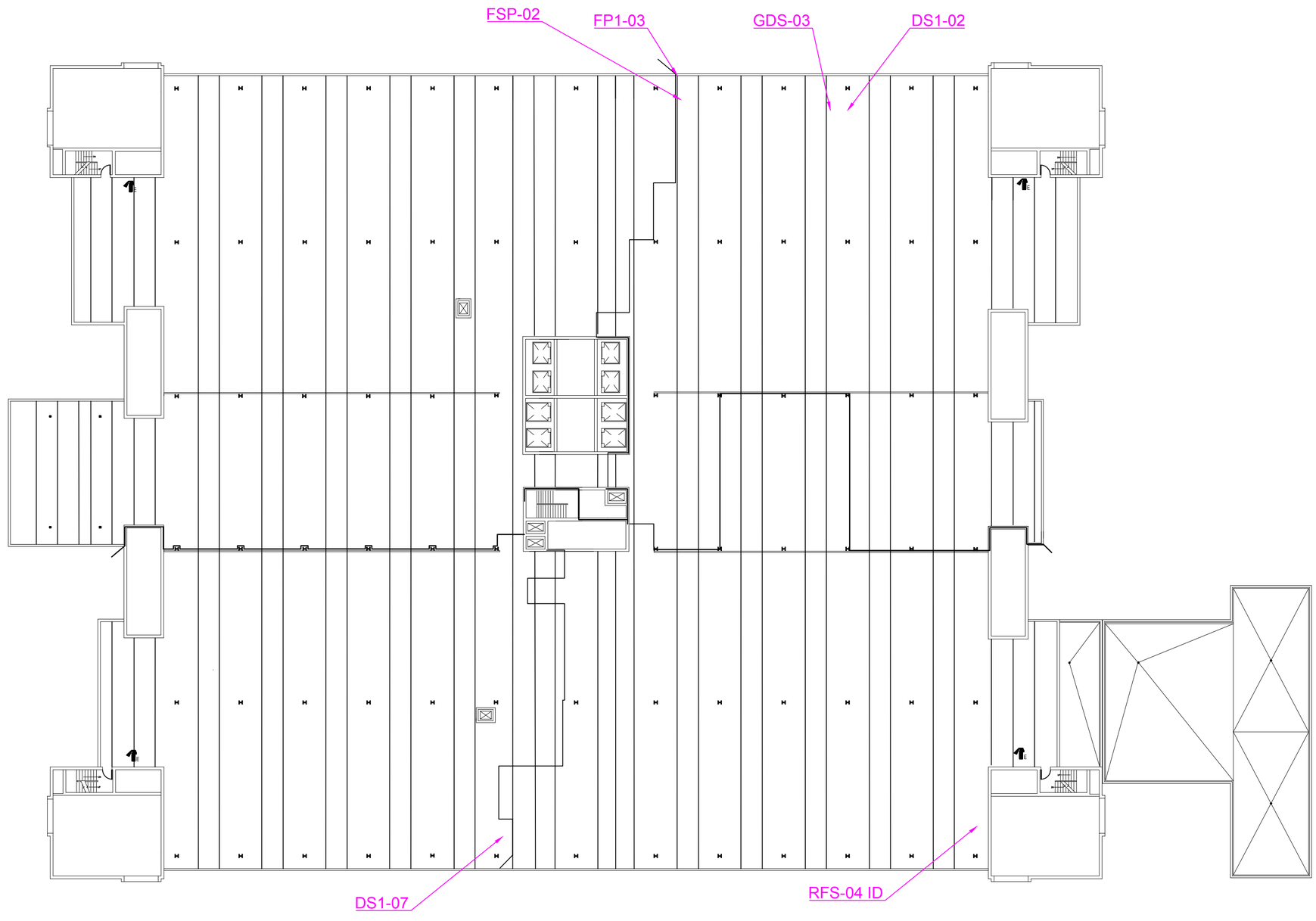
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-2.0



BUILDING 41 - INTERSTITIAL 3RD FLOOR

LEGEND

CLK-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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RAYMOND G. MURPHY VA MEDICAL CENTER
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ALBUQUERQUE, NM 87108

SHEET TITLE:

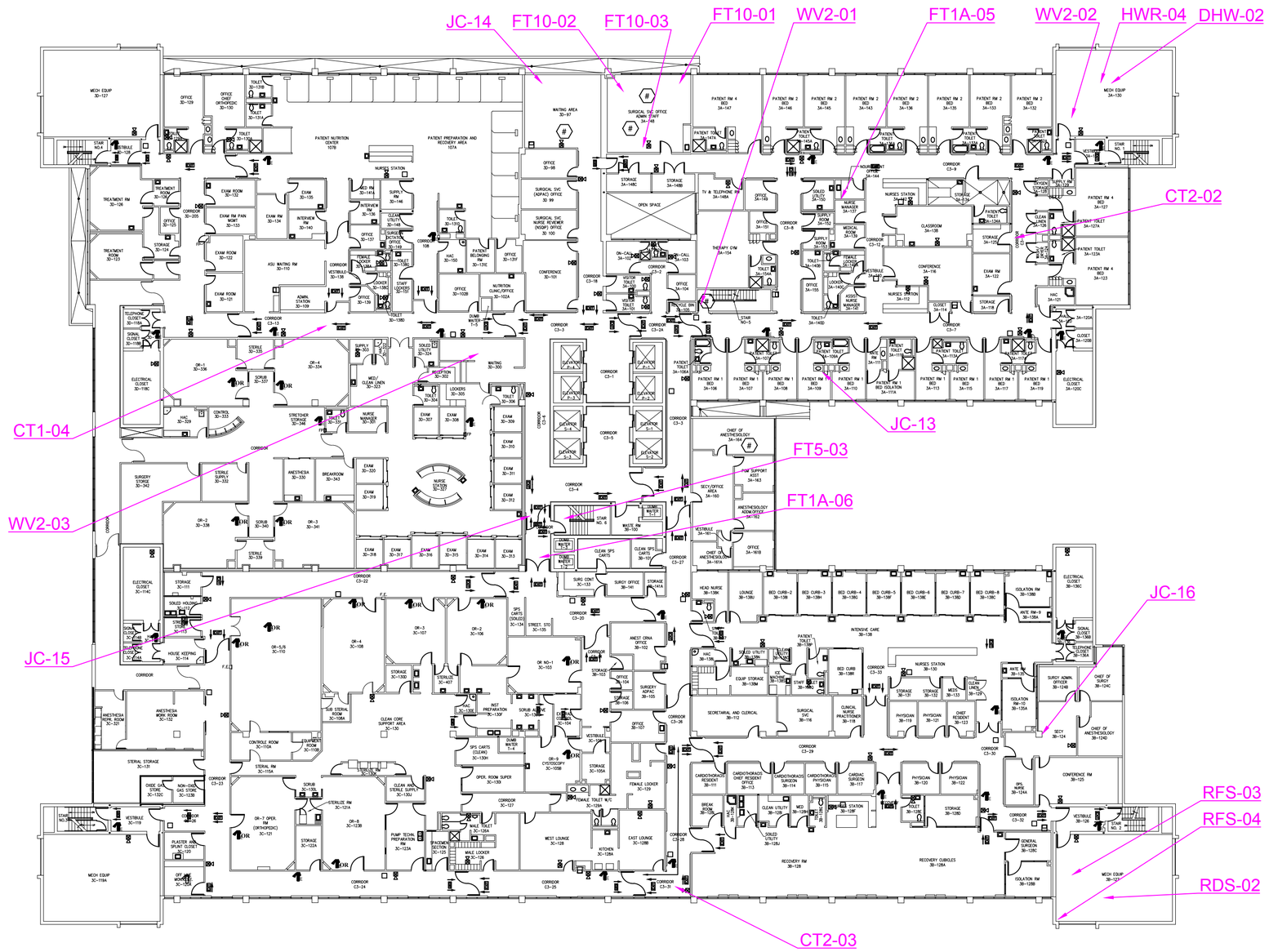
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-2.1



BUILDING 41 - 3RD FLOOR

LEGEND

CT1-01 - ACM SAMPLE LOCATION

GRAPHICAL SCALE (FT) 0 5 10 15 30

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ALBUQUERQUE, NM 87108

SHEET TITLE:

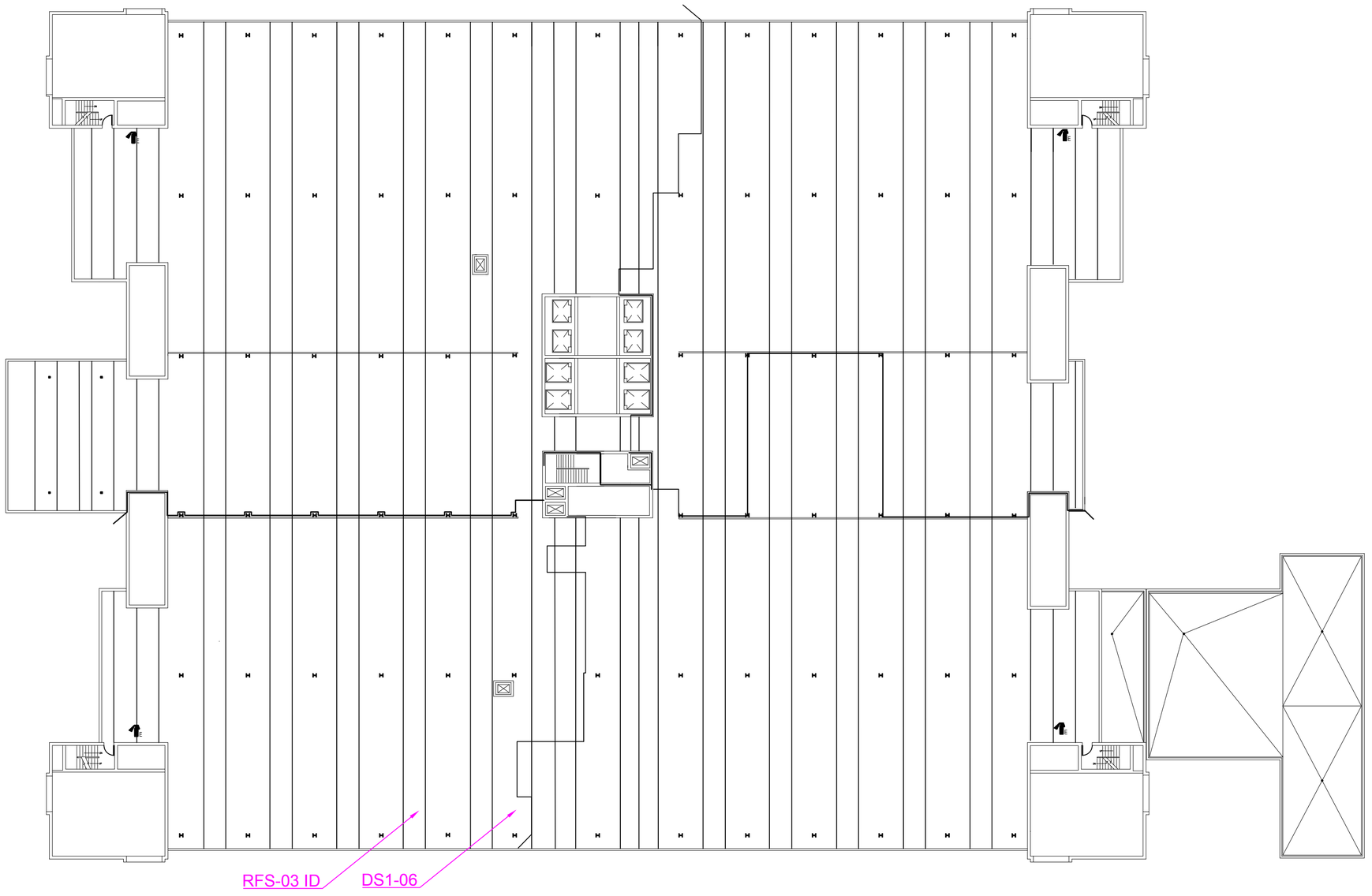
BUILDING 41
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-3.0



BUILDING 41 - INTERSTITIAL 4TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30
GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-3.1

BUILDING 41 - 4TH FLOOR

LEGEND

CT-01 - ACM SAMPLE LOCATION

0 5 10 15 30
GRAPHICAL SCALE (FT)

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SHEET TITLE:

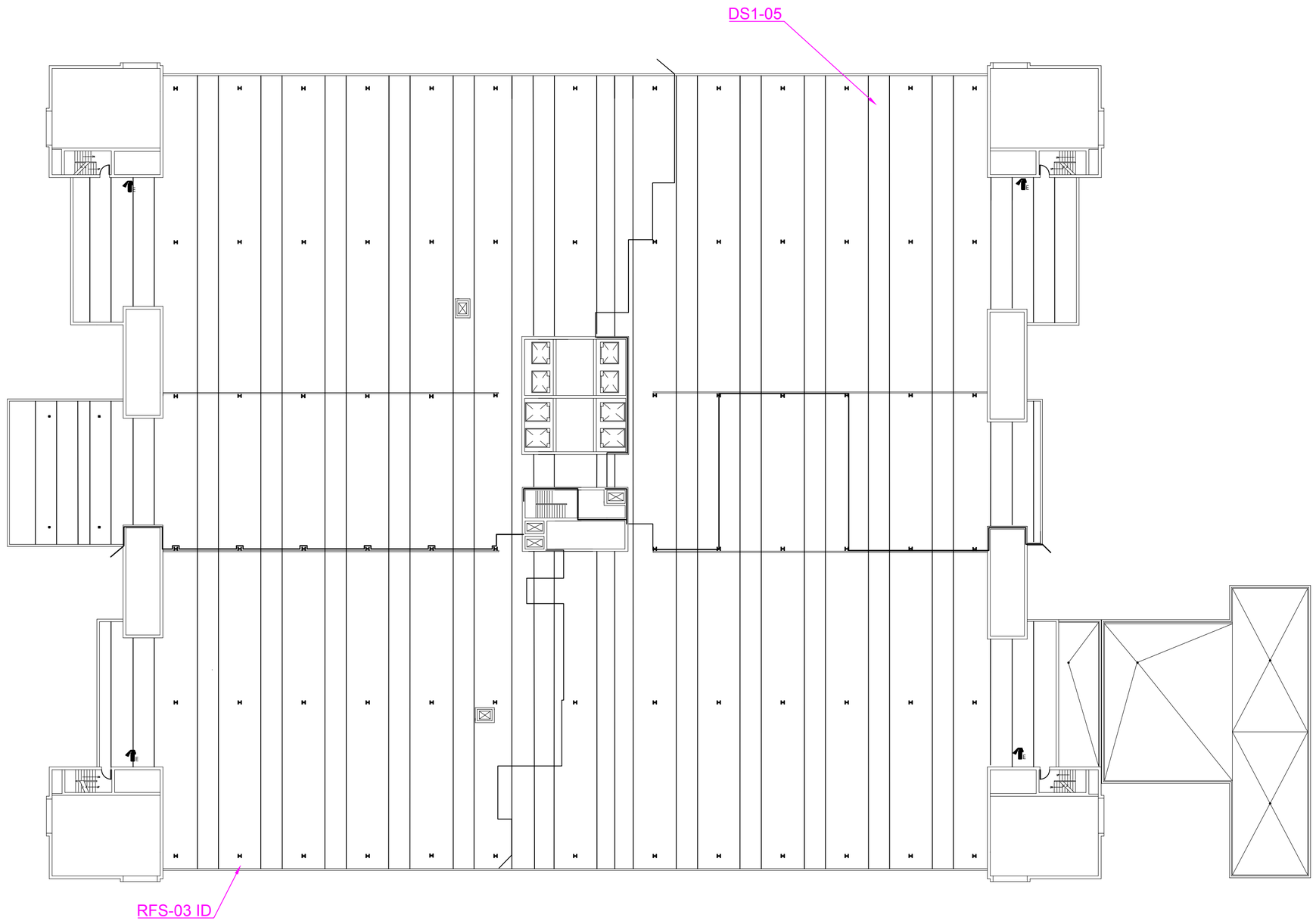
BUILDING 41
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-4.0



BUILDING 41 - INTERSTITIAL 5TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30
GRAPHICAL SCALE (FT)

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SHEET TITLE:

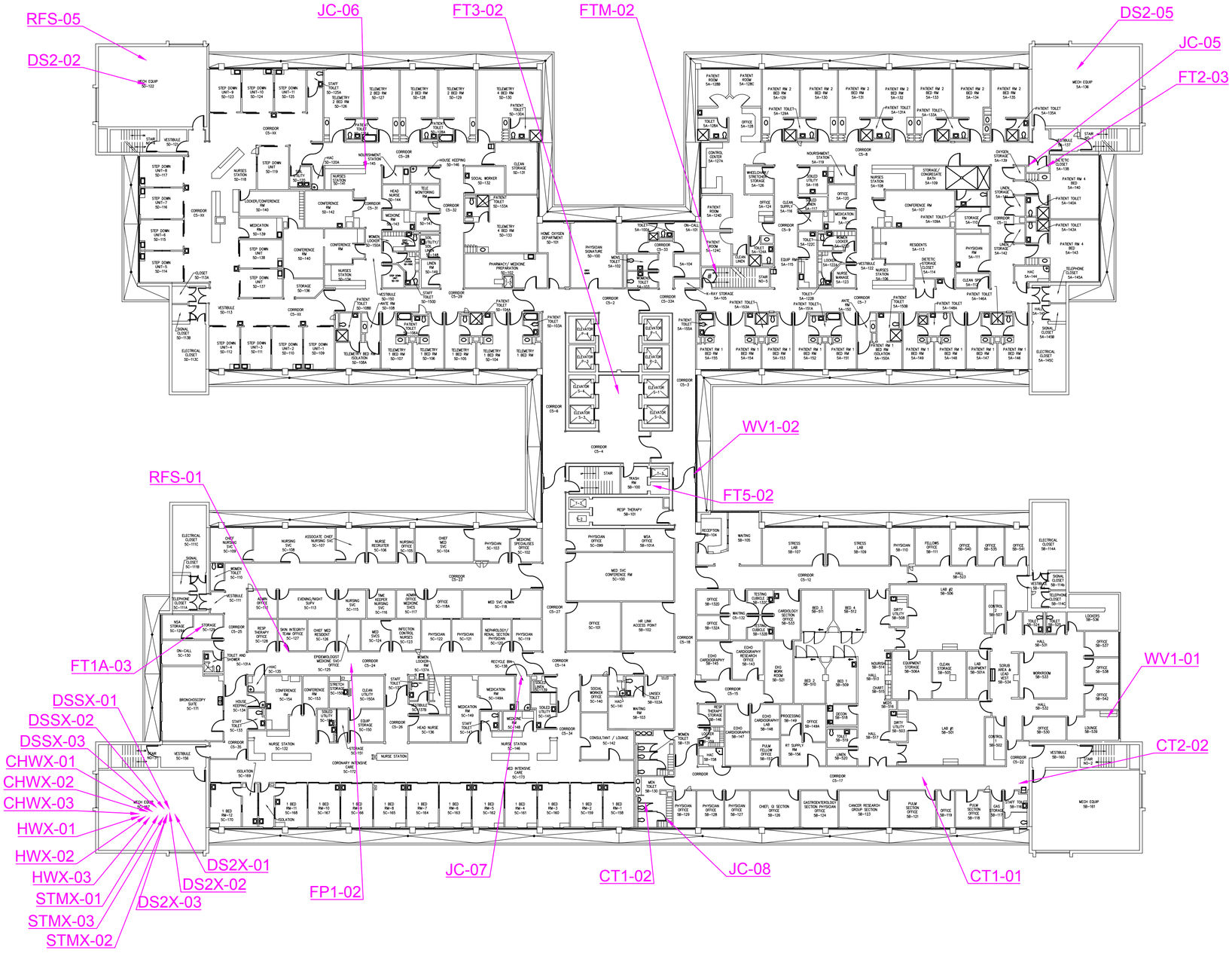
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-4.1



BUILDING 41 - 5TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 41
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-5.0

BUILDING 41 - INTERSTITIAL 6TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30
GRAPHICAL SCALE (FT)

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ALBUQUERQUE, NM 87108

SHEET TITLE:

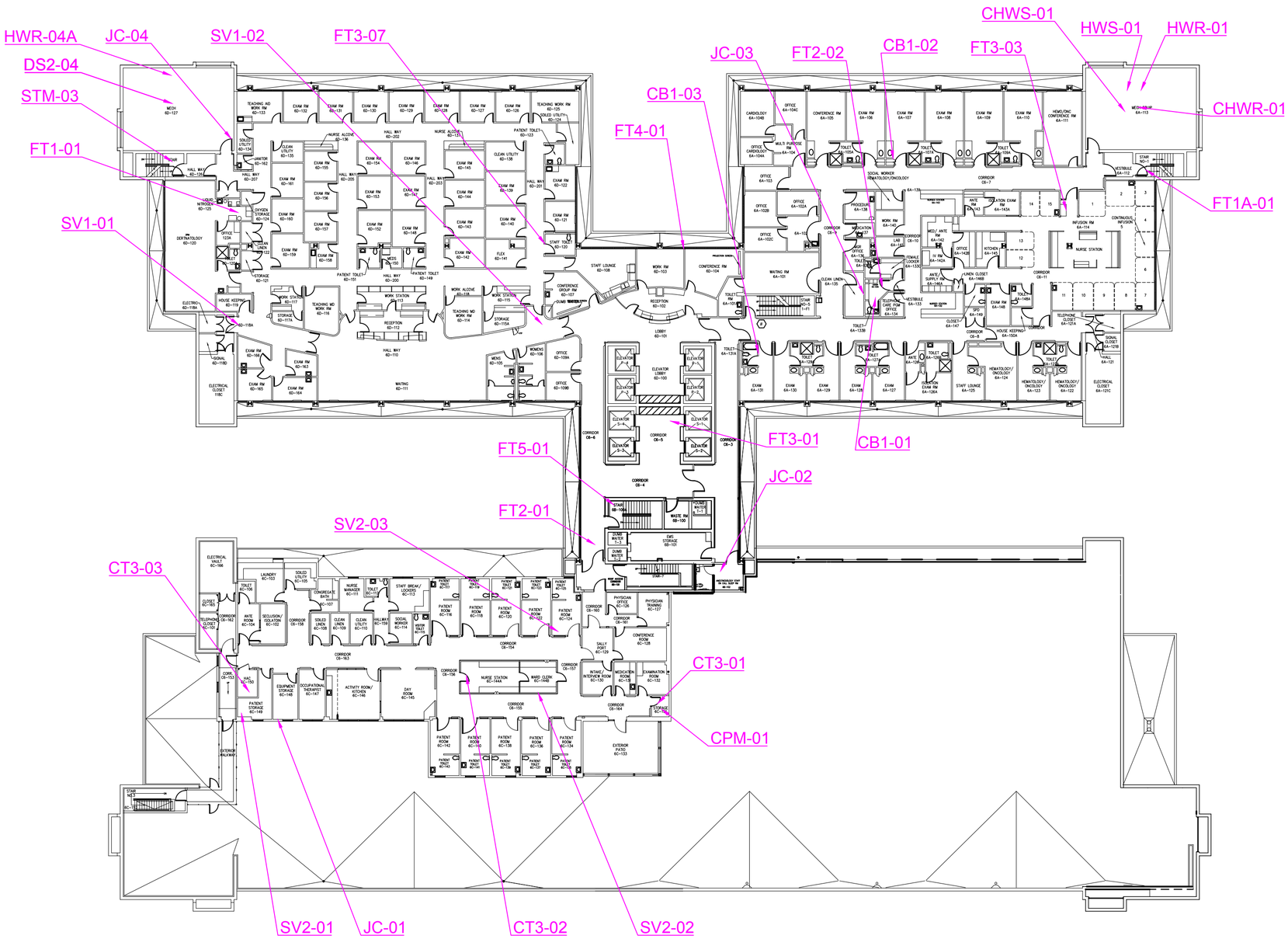
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-5.1



BUILDING 41 - 6TH FLOOR

LEGEND

CLK-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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ALBUQUERQUE, NM 87108

SHEET TITLE:

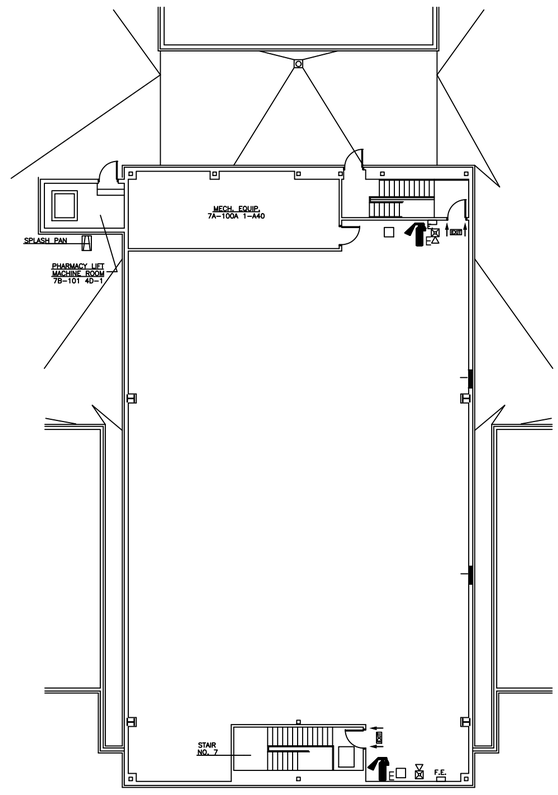
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-6.0



BUILDING 41 - INTERSTITIAL 7TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

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ALBUQUERQUE, NM 87108

SHEET TITLE:

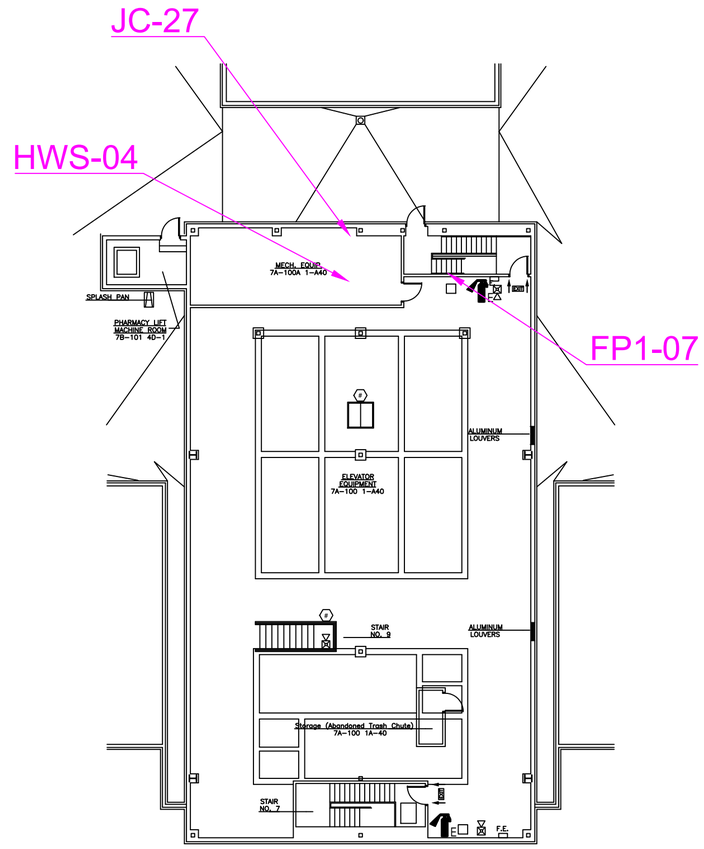
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-6.1



BUILDING 41 - 7TH FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
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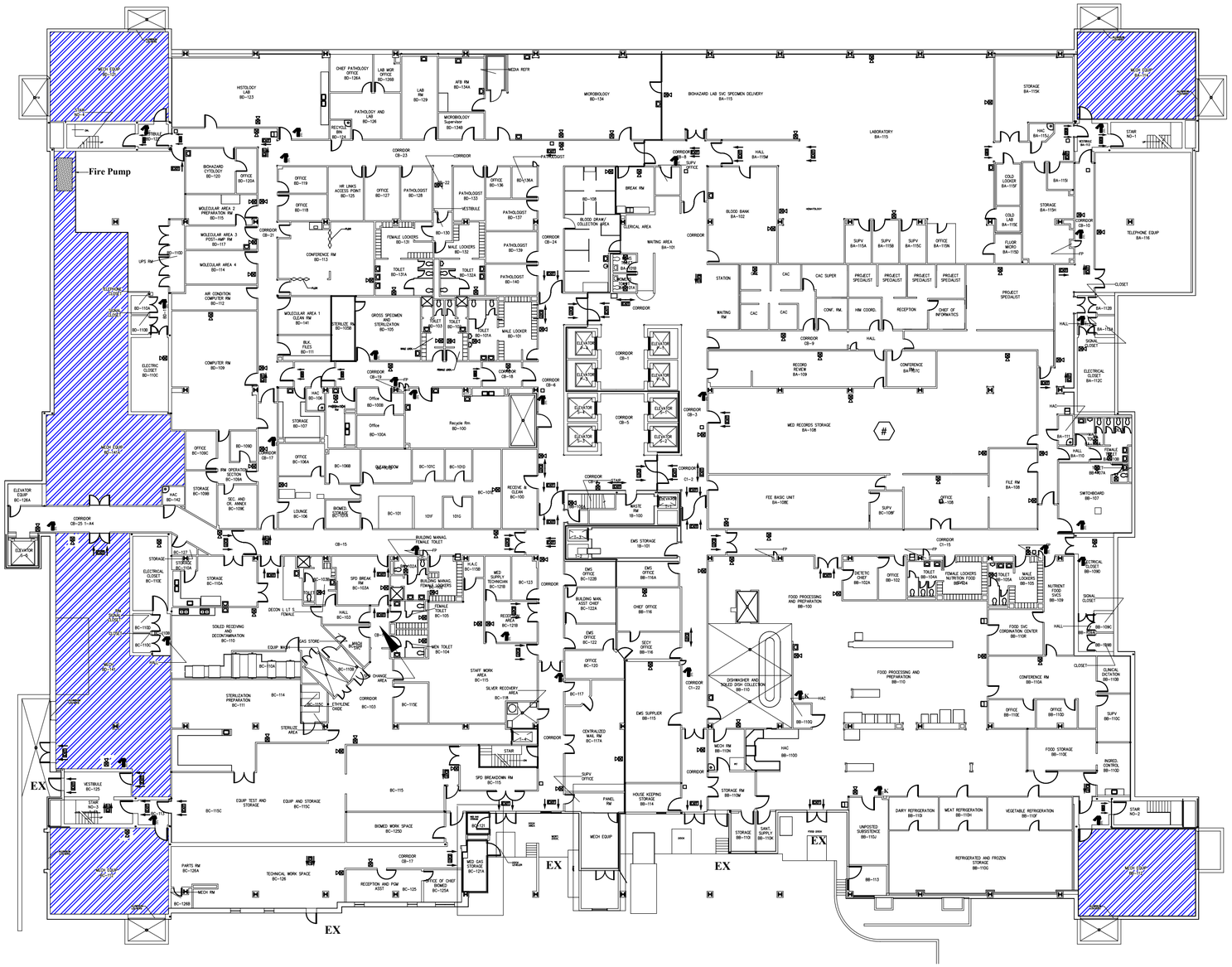
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-7.0



TSI

MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - BASEMENT ACM LOCATIONS

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

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SHEET TITLE:

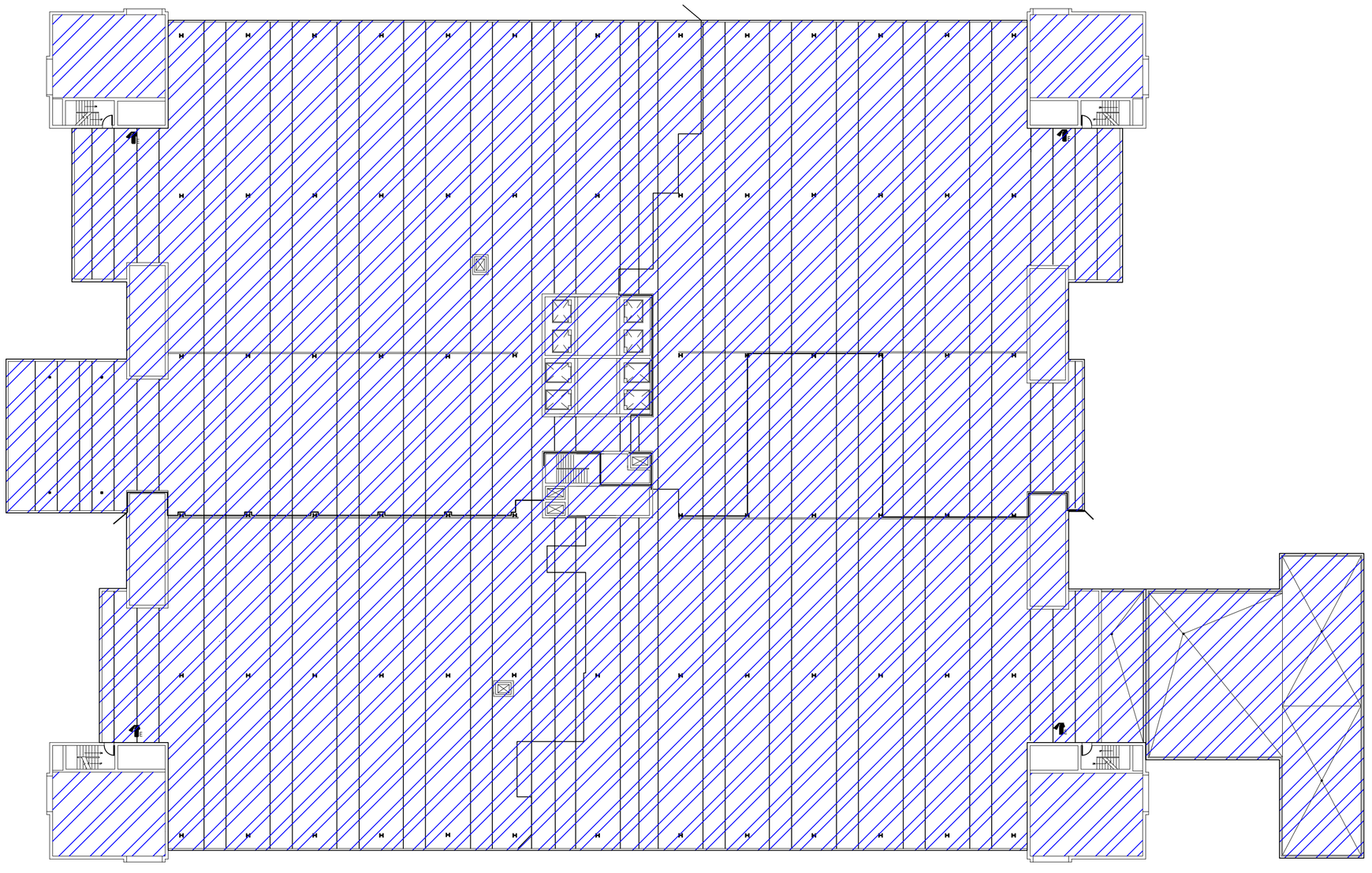
BUILDING 41
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-B-AL



TSI

MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 1ST FLOOR ACM LOCATIONS

0 5 10 15 30
GRAPHICAL SCALE (FT)

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SHEET TITLE:

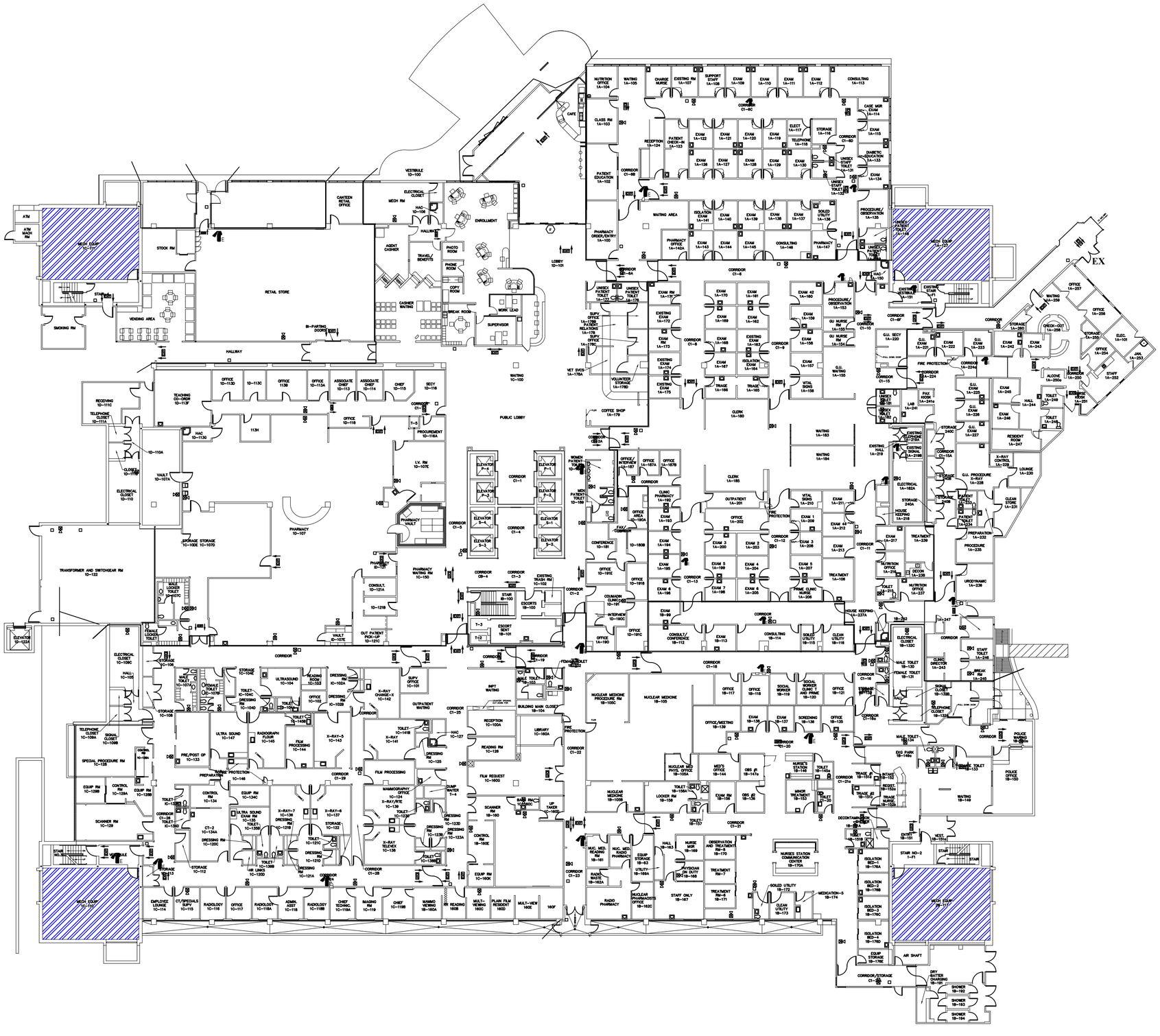
BUILDING 41
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-B.1-AL


EX
MECH EQUIP 1C-117
MECH EQUIP 1C-111
MECH EQUIP 1B-117
MECH EQUIP 1C-107
ELEVATOR 1C-122
ELEVATOR 1C-123
ELEVATOR 1C-124
ELEVATOR 1C-125
ELEVATOR 1C-126
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ELEVATOR 1C-141
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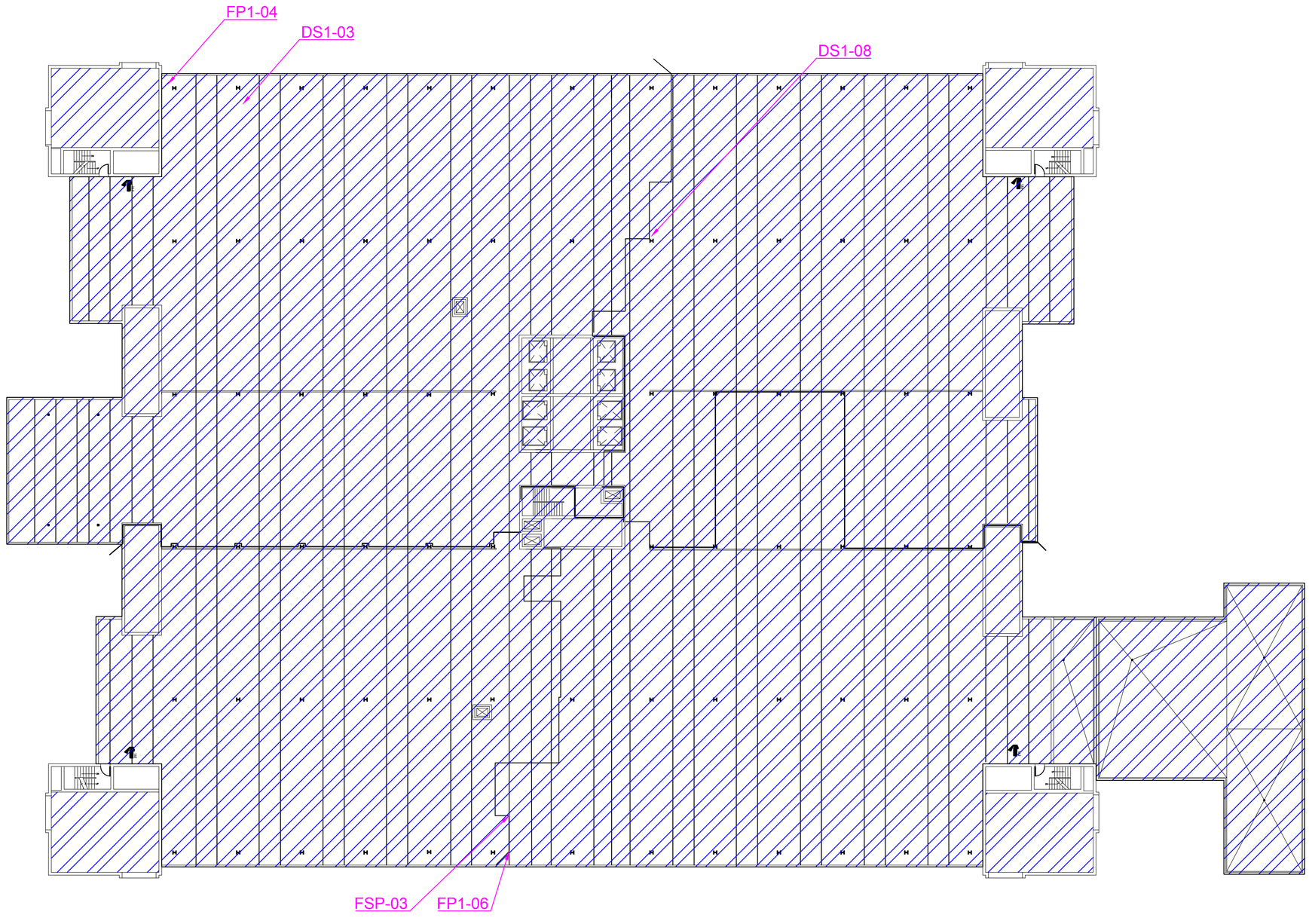

TSI

MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 2ND FLOOR ACM LOCATIONS

LEGEND

CLK-01 - ACM SAMPLE LOCATION

0 5 10 15 30

GRAPHICAL SCALE (FT)

MEC^X

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

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OTHER OFFICES:

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

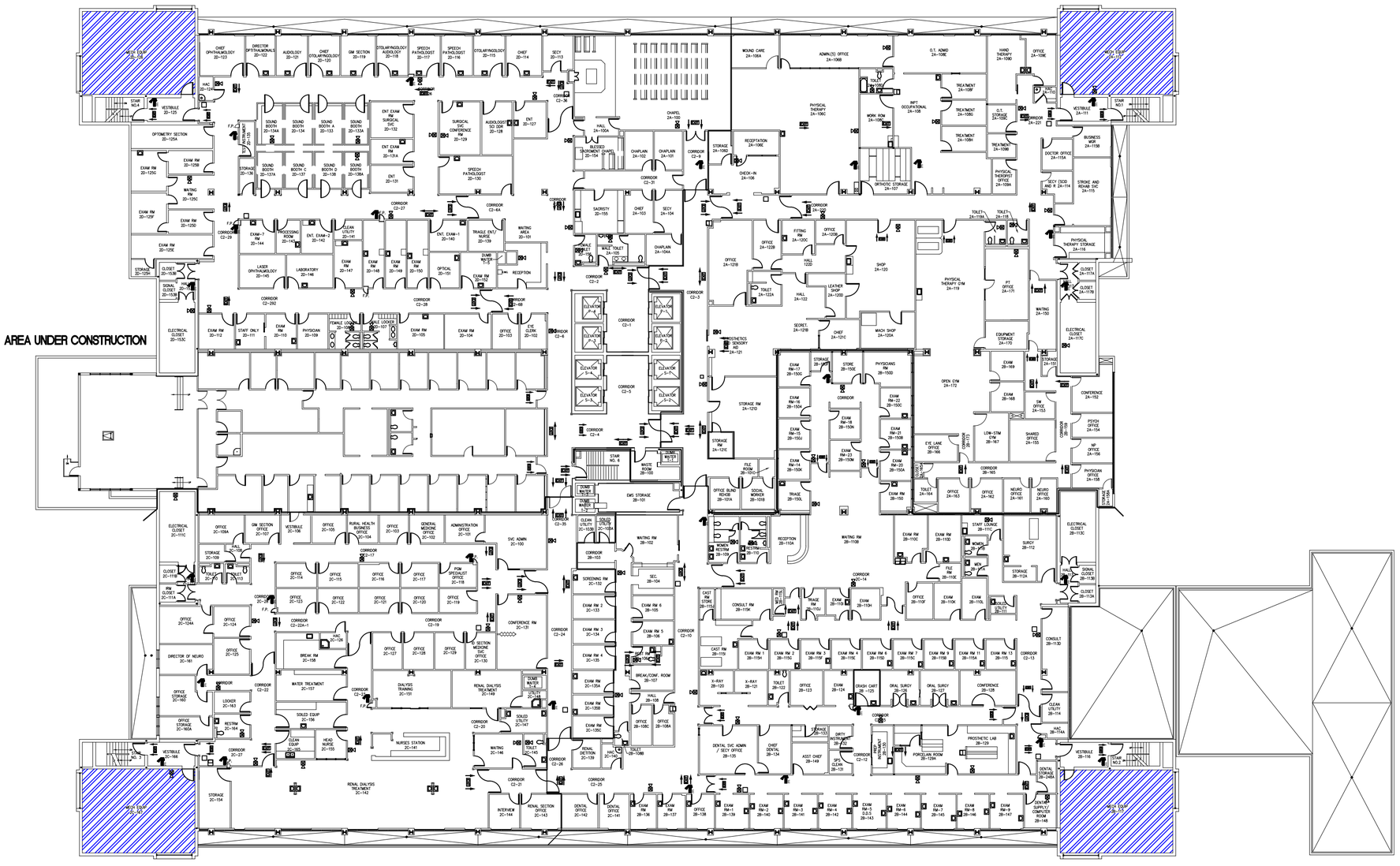
BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-1.1-AL



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MISCELLANEOUS

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BUILDING 41 - 2ND FLOOR ACM LOCATIONS

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SHEET TITLE:

BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

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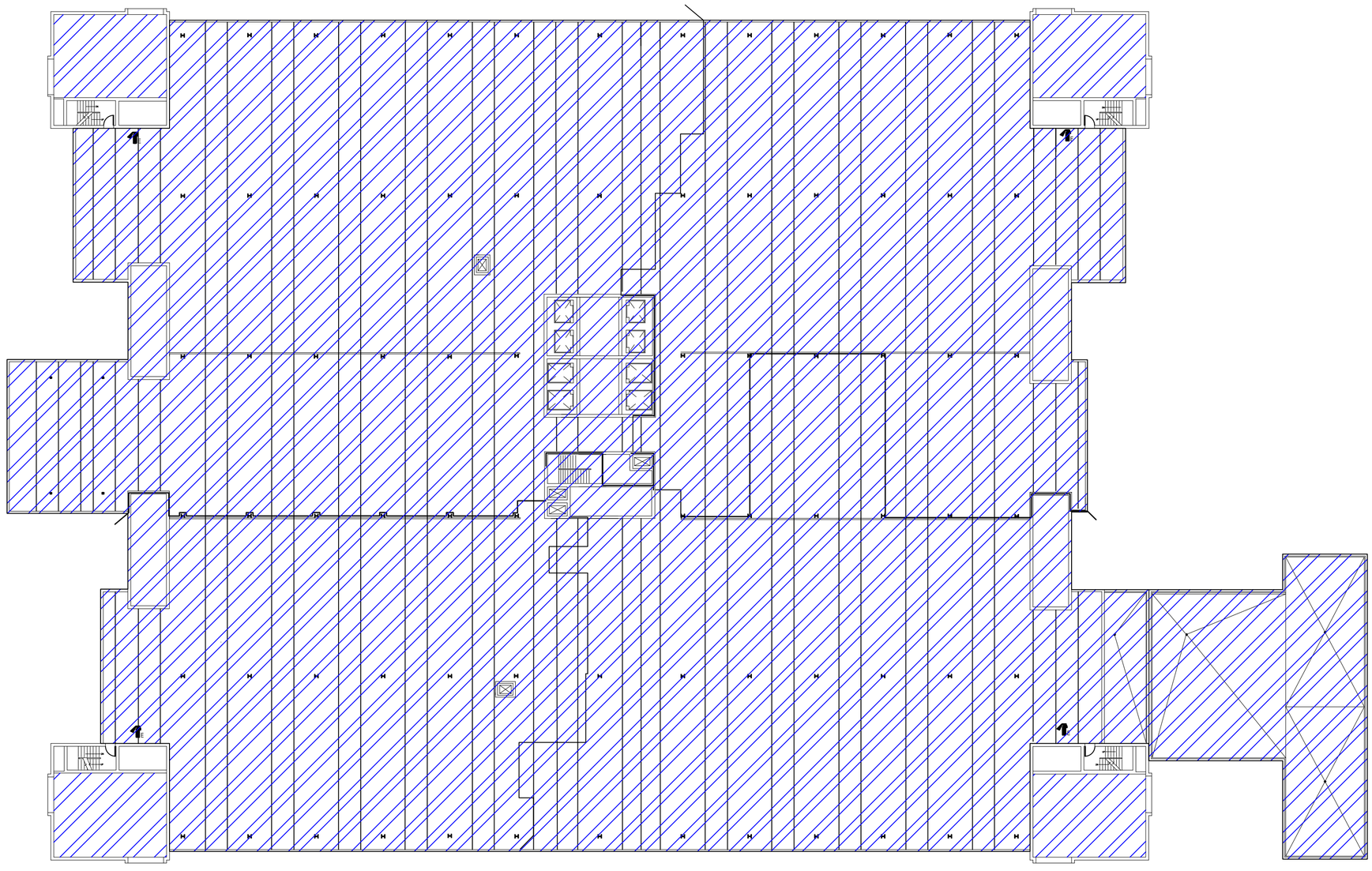
NMVA41-2.0-AL



TSI

MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 3RD FLOOR ACM LOCATIONS

0 5 10 15 30

GRAPHICAL SCALE (FT)

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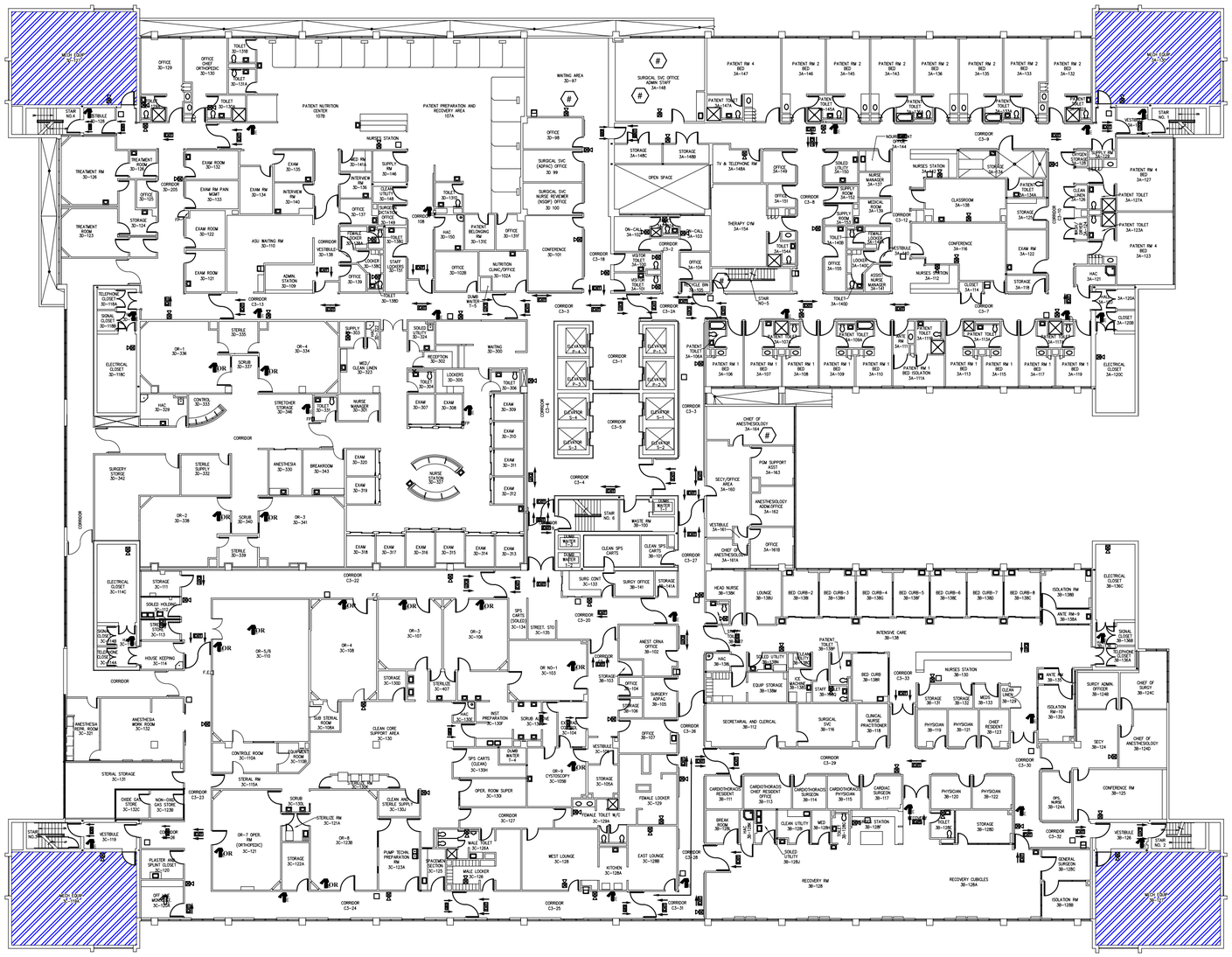

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MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - 3RD FLOOR ACM LOCATIONS

GRAPHICAL SCALE (FT) 0 5 10 15 30

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

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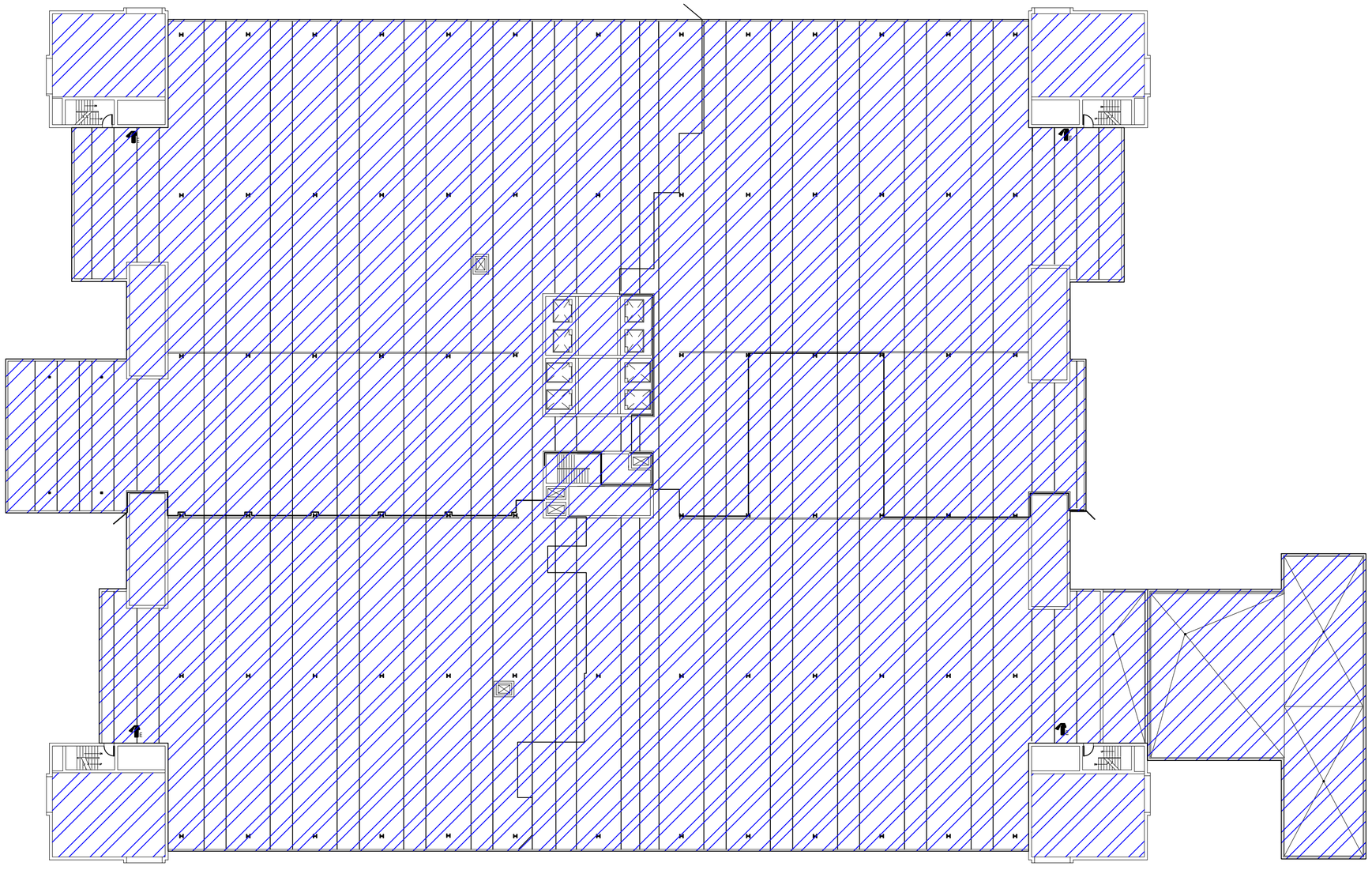
NMVA41-3.0-AL



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MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 4TH FLOOR ACM LOCATIONS

0 5 10 15 30

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1501 SAN PEDRO SE
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SHEET TITLE:

BUILDING 41
ACM LOCATIONS

PROJECT #
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REV.NO.	DATE
ORIGINAL	10/05/2015

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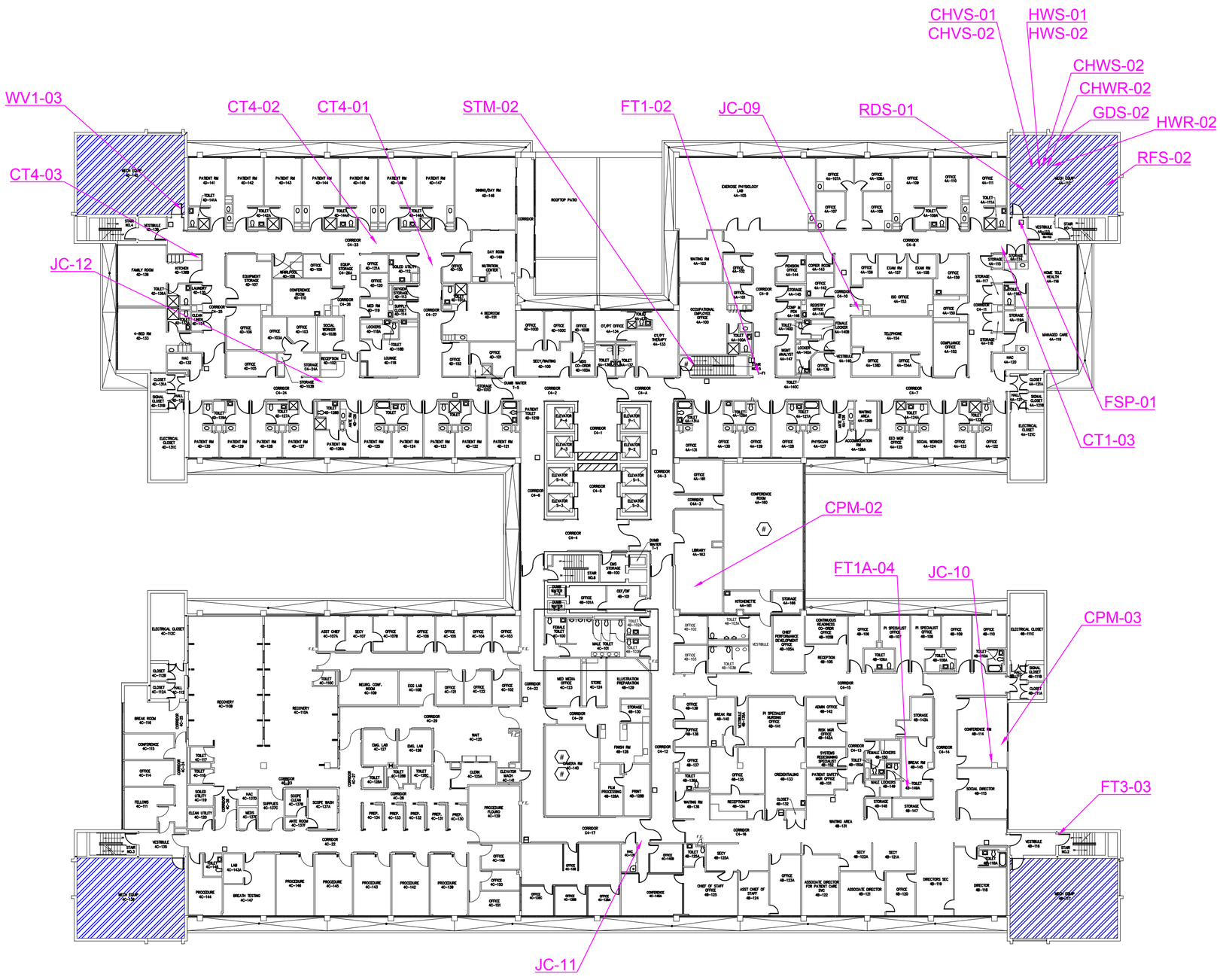

TSI

MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - 4TH FLOOR ACM LOCATIONS

LEGEND

CS-XX - ACM SAMPLE LOCATION

0 5 10 15 30

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PROJECT #
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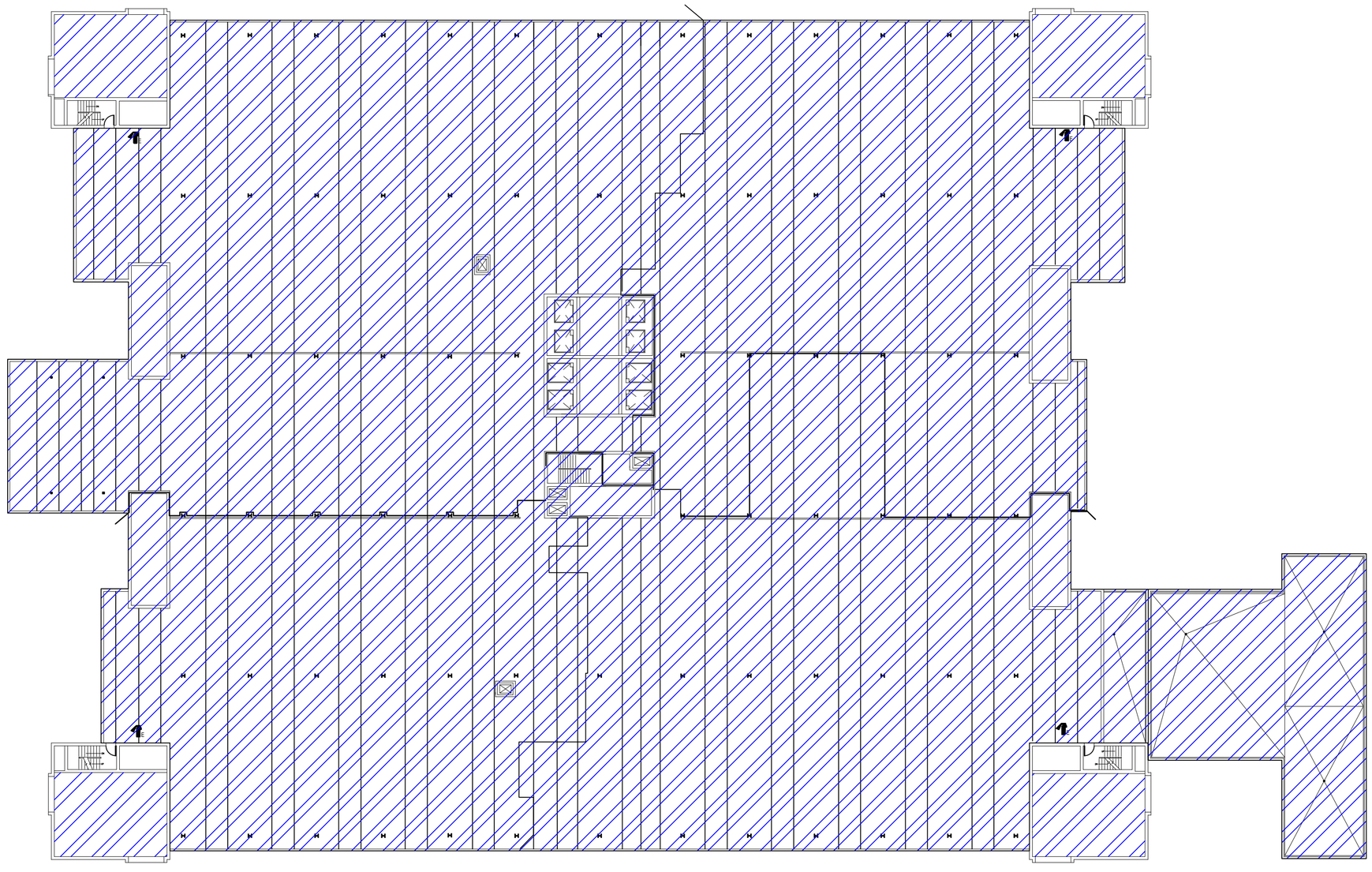
NMVA41-4.0-AL



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MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 5TH FLOOR ACM LOCATIONS

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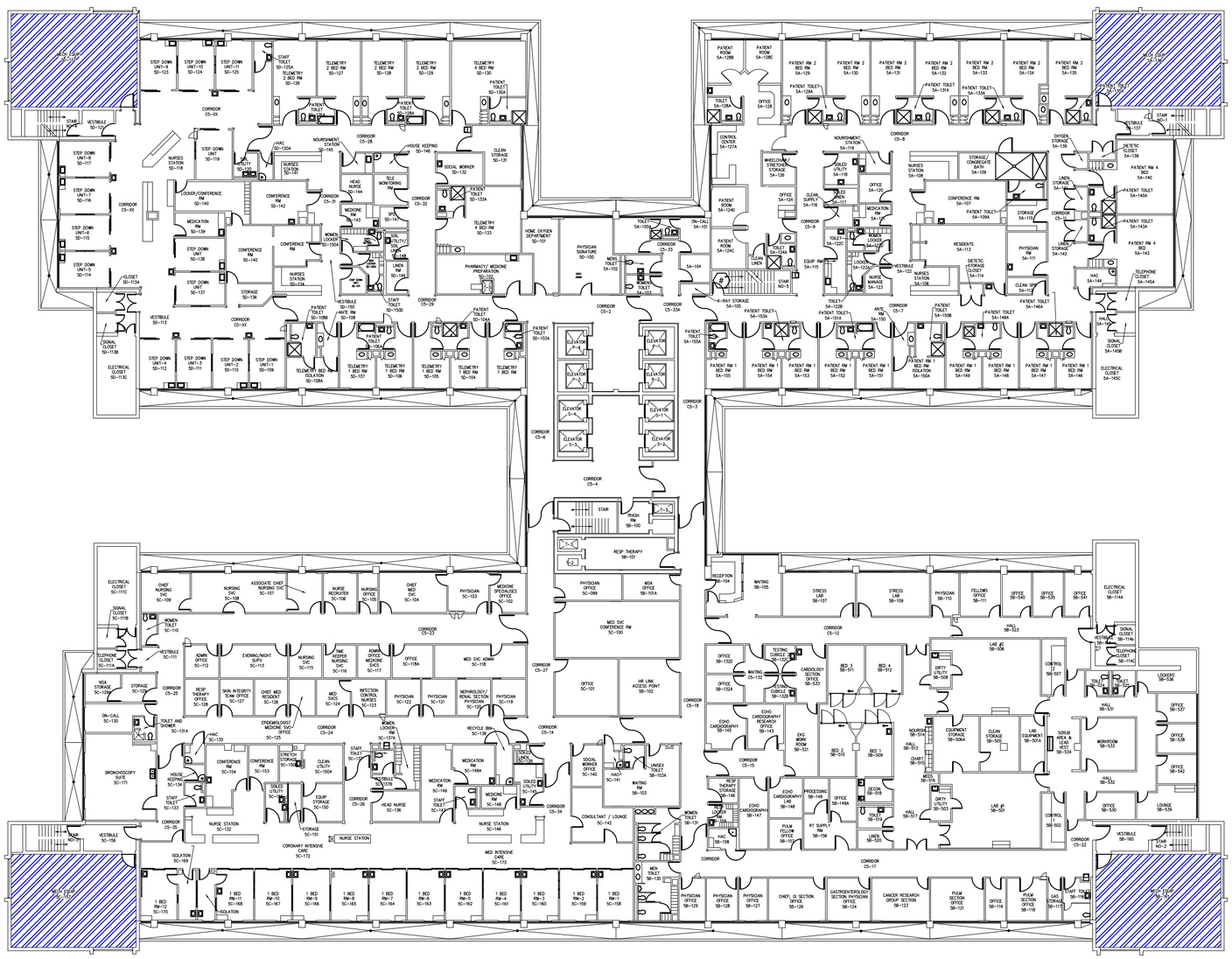
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STAIR 5A-1
VESTIBULE 5A-137
STEP DOWN UNIT-9 5D-103
STEP DOWN UNIT-10 5D-124
STEP DOWN UNIT-11 5D-125
STAFF TOILET 5D-125A
TELEMETRY 2 BED RM 5D-126
TELEMETRY 2 BED RM 5D-127
TELEMETRY 2 BED RM 5D-128
TELEMETRY 2 BED RM 5D-129
TELEMETRY 4 BED RM 5D-130
PATIENT TOILET 5D-130A
CORRIDOR C5-XX
NURSES STATION 5D-118
NURSES STATION 5D-147
NOURISHMENT STATION 5D-145
CORRIDOR C5-28
HOUSE KEEPING 5D-146
SOCIAL WORKER 5D-132
CLEAN STORAGE 5D-131
STEP DOWN UNIT-8 5D-117
STEP DOWN UNIT-7 5D-116
STEP DOWN UNIT-6 5D-115
STEP DOWN UNIT-5 5D-114
LOCKER/CONFERENCE RM 5D-140
CONFERENCE RM 5D-142
CORRIDOR C5-31
HEAD NURSE 5D-144
TELE MONITORING RM
CORRIDOR C5-32
PATIENT TOILET 5D-133A
TELEMETRY 4 BED RM 5D-133
MEDICATION RM 5D-139
STEP DOWN UNIT 5D-138
CONFERENCE RM 5D-140
CONFERENCE RM
NURSES STATION 5D-134
STORAGE 5D-136
STEP DOWN UNIT 5D-137
CLOSET 5D-113A
VESTIBULE 5D-113
CORRIDOR C5-XX
HOME OXYGEN DEPARTMENT 5D-101
PHARMACY/ MEDICINE PREPARATION 5D-102
PHYSICIAN SIGNATURE 5D-100
MENS TOILET 5A-102
ON-CALL 5A-101
TOILET 5A-100A
CORRIDOR C5-33
5A-104
CORRIDOR C5-2
STAFF TOILET 5D-150A
PATIENT TOILET 5D-103A
PATIENT TOILET 5D-108B
PATIENT TOILET 5D-108A
VESTIBULE 5D-110
WMN TOILET 5D-109
PATIENT TOILET 5D-107A
TELEMETRY 1 BED ISOLATION 5D-106A
TELEMETRY 1 BED RM 5D-107
TELEMETRY 1 BED RM 5D-106
TELEMETRY 1 BED RM 5D-105
TELEMETRY 1 BED RM 5D-104
SIGNAL CLOSET 5D-113B
ELECTRICAL CLOSET 5D-113C
STEP DOWN UNIT-4 5D-112
STEP DOWN UNIT-3 5D-111
STEP DOWN UNIT-2 5D-110
STEP DOWN UNIT-1 5D-109
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CORRIDOR C5-4
CORRIDOR C5-6
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X-RAY STORAGE 5A-105
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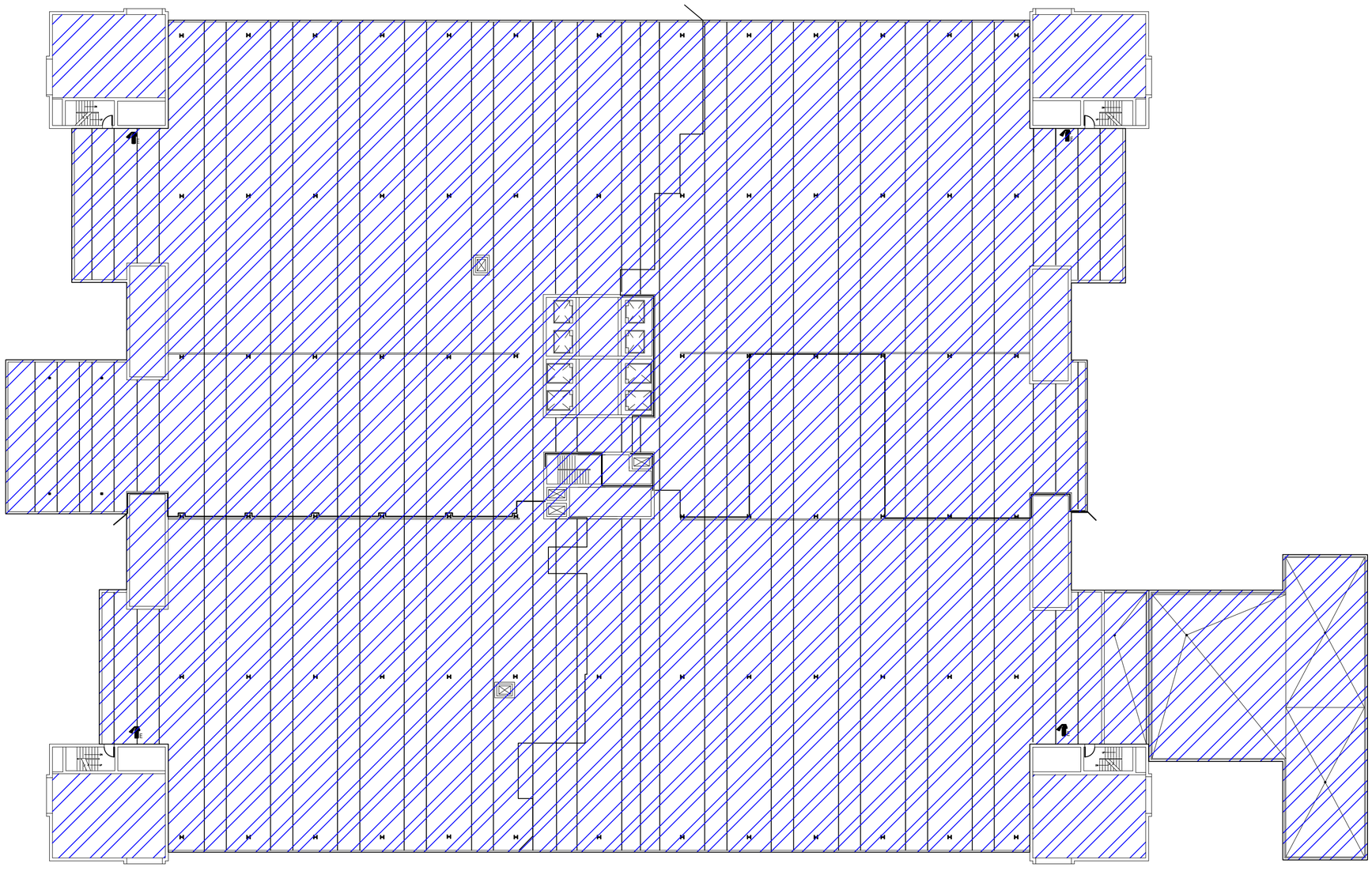

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MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - INTERSTITIAL 6TH FLOOR

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GRAPHICAL SCALE (FT)

MEC^X

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

WWW.MECX.NET

OTHER OFFICES:

CHICAGO, IL

DENVER, CO

SDVOSB

A SERVICE-DISABLED VETERAN OWNED SMALL BUSINESS

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
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ORIGINAL	10/05/2015

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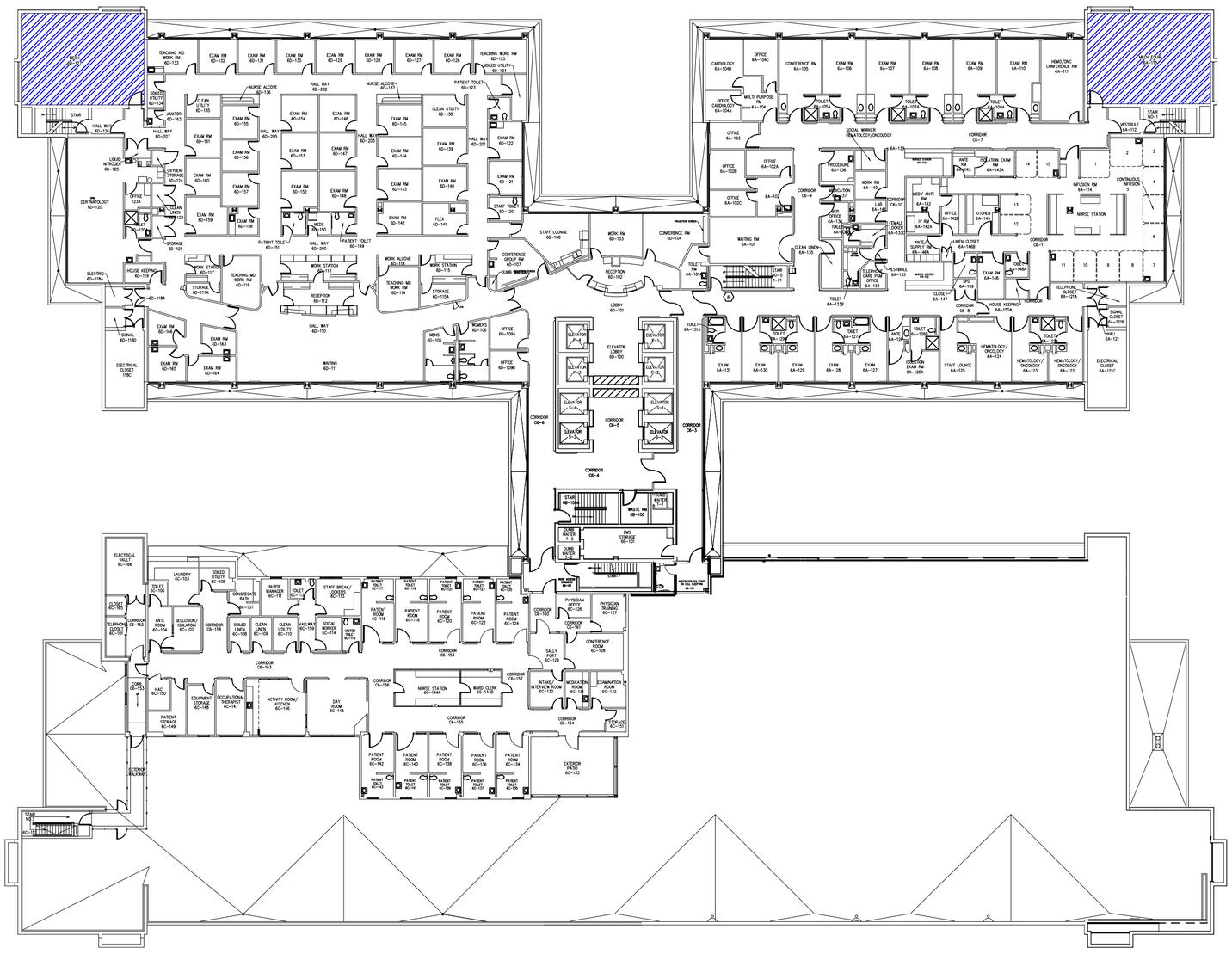

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MISCELLANEOUS

SURFACING MATERIAL

BUILDING 41 - 6TH FLOOR ACM LOCATIONS

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GRAPHICAL SCALE (FT)

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8864 INTERCHANGE DRIVE
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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

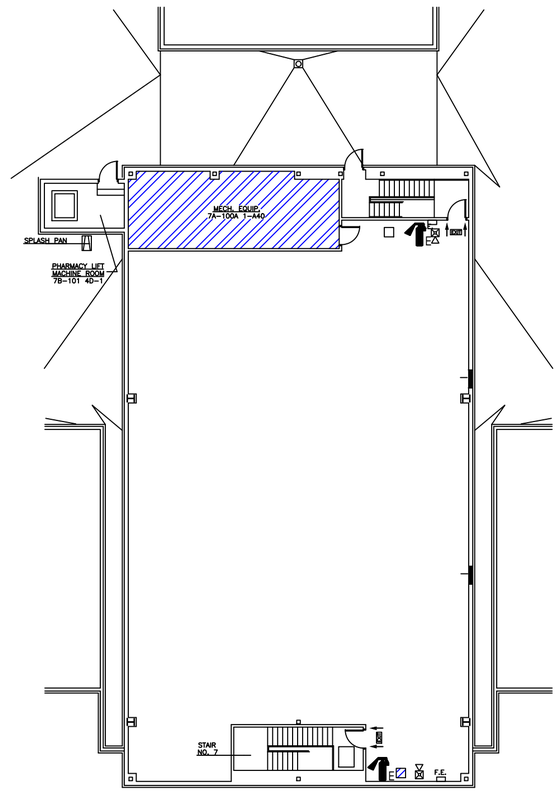
BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-6.0-AL



BUILDING 41 - INTERSTITIAL 7TH FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 15 30
GRAPHICAL SCALE (FT)

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

WWW.MECX.NET

OTHER OFFICES:

CHICAGO, IL

DENVER, CO

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

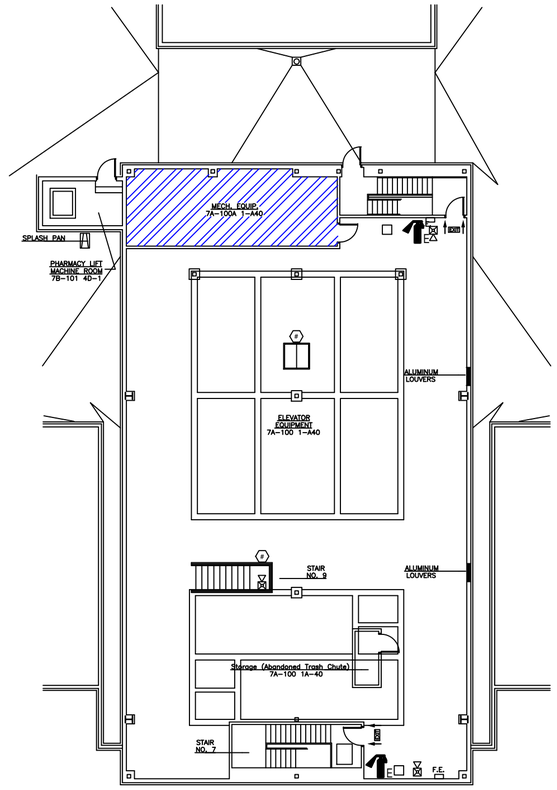
BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-6.1-AL



BUILDING 41 - 7TH FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 15 30

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

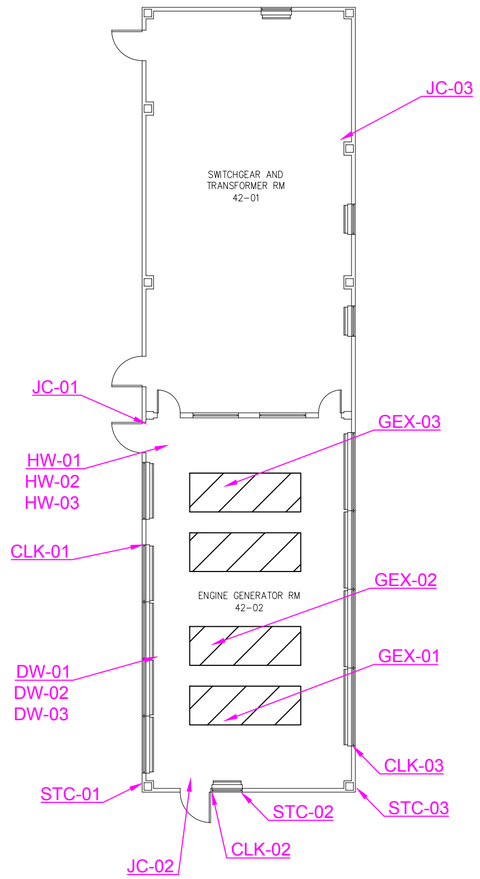
BUILDING 41
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA41-7.0-AL



BUILDING #42 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

- GENERATOR

0 5 10 15 30

GRAPHICAL SCALE (FT)

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INTERIM REVIEW ONLY

PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

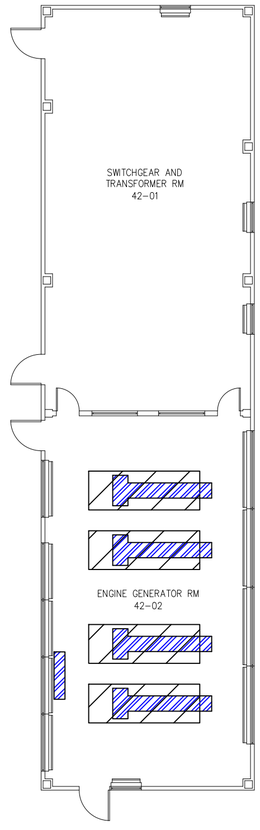
BUILDING 42
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA42-1.0



BUILDING #42 - 1ST FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 15 30

GRAPHICAL SCALE (FT)

MEC^X

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INTERIM REVIEW ONLY

PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

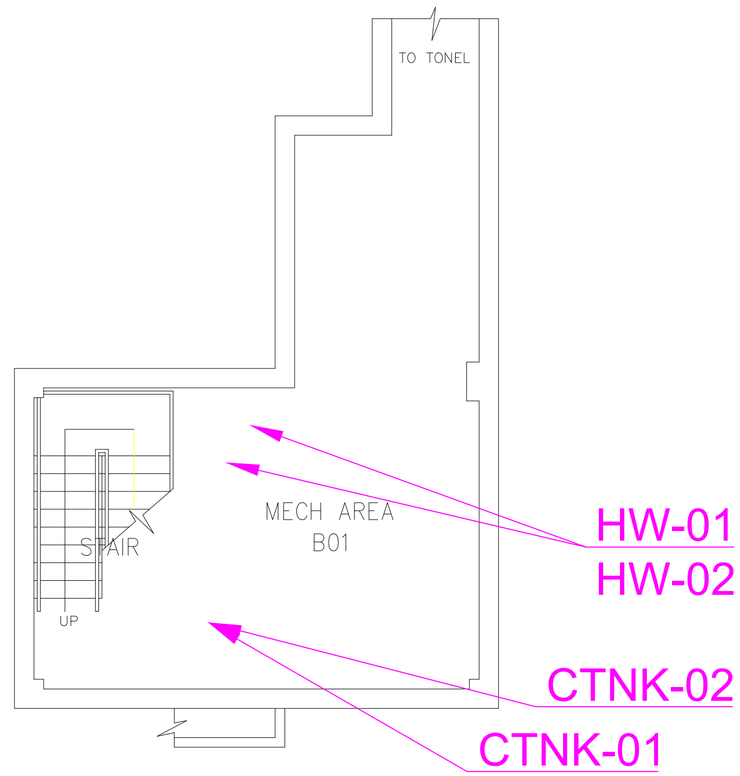
BUILDING 42
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA42-1.0-AL



BUILDING #43 - BASEMENT

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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8864 INTERCHANGE DRIVE
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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

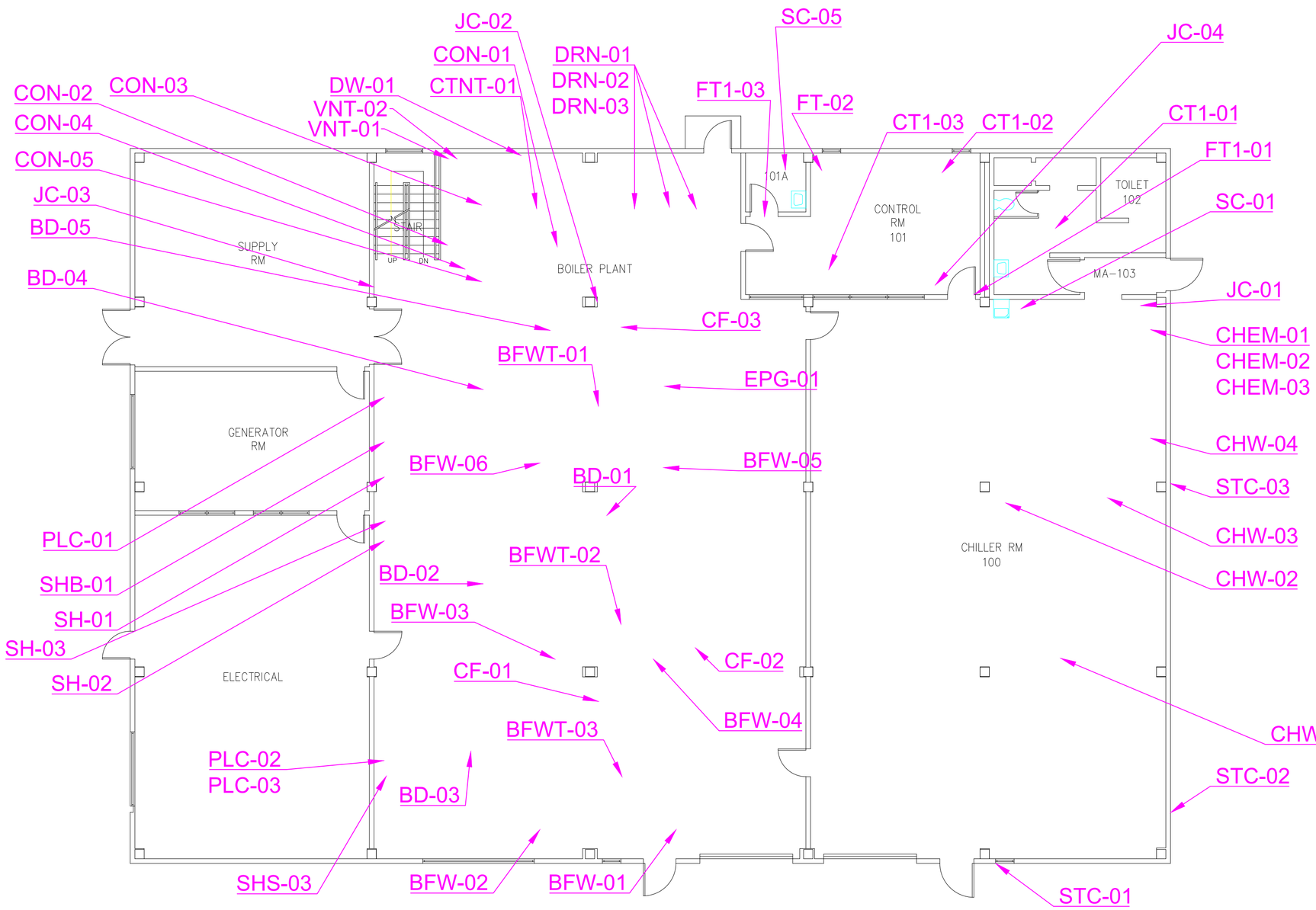
BUILDING 43
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA43-B



BUILDING #43 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

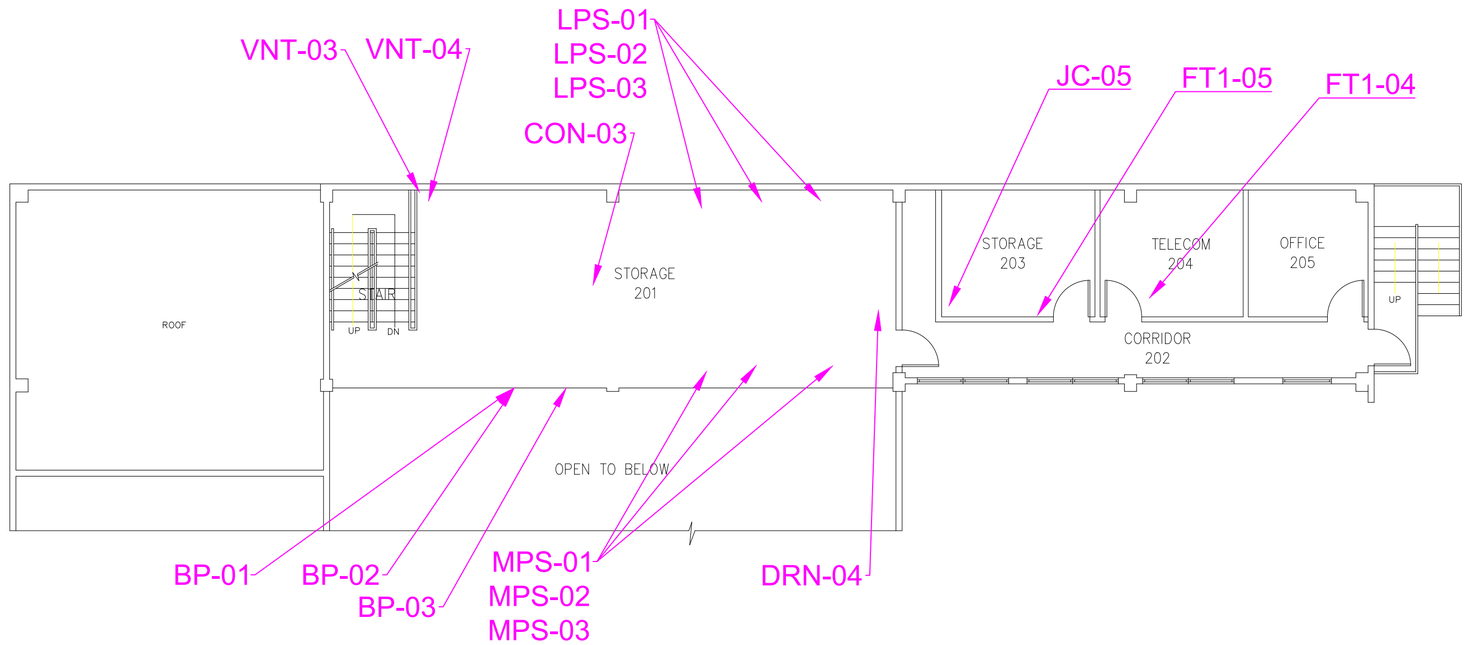
BUILDING 43
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA43-1.0



BUILDING #43 - 2ND FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 43
ACM SAMPLE
LOCATIONS

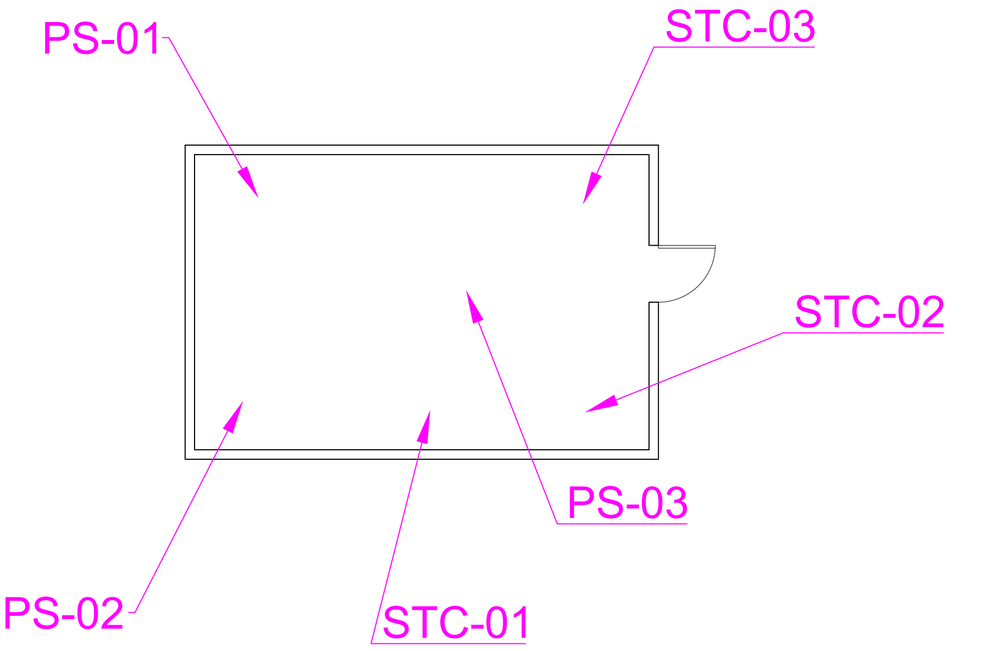
PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA43-2.0



BUILDING #43A

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

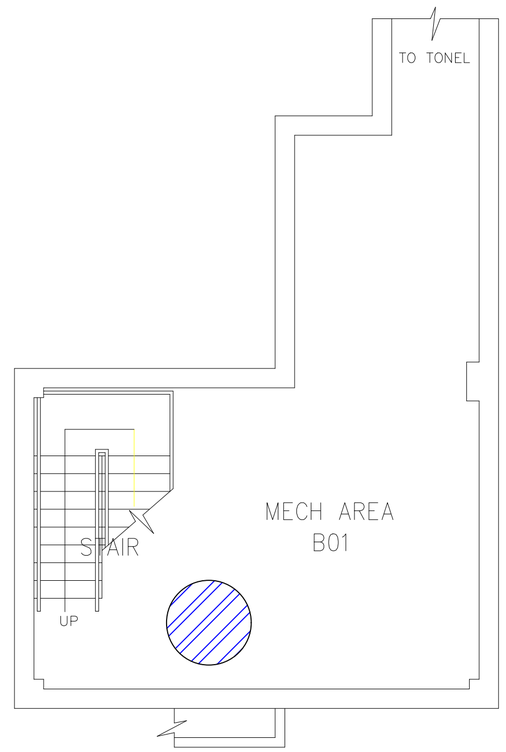
BUILDING 43
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA43A-1.0



BUILDING #43 - BASEMENT ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 43
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA43-B-AL

BUILDING #43 - 1ST FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

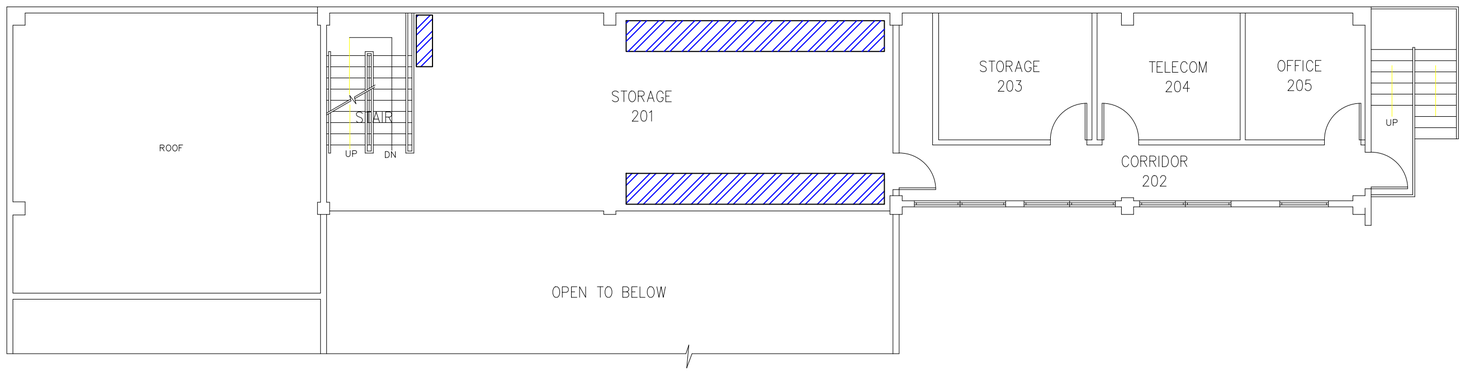
BUILDING 43
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA43-1.0-AL



BUILDING #43 - 2ND FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 43
ACM LOCATIONS

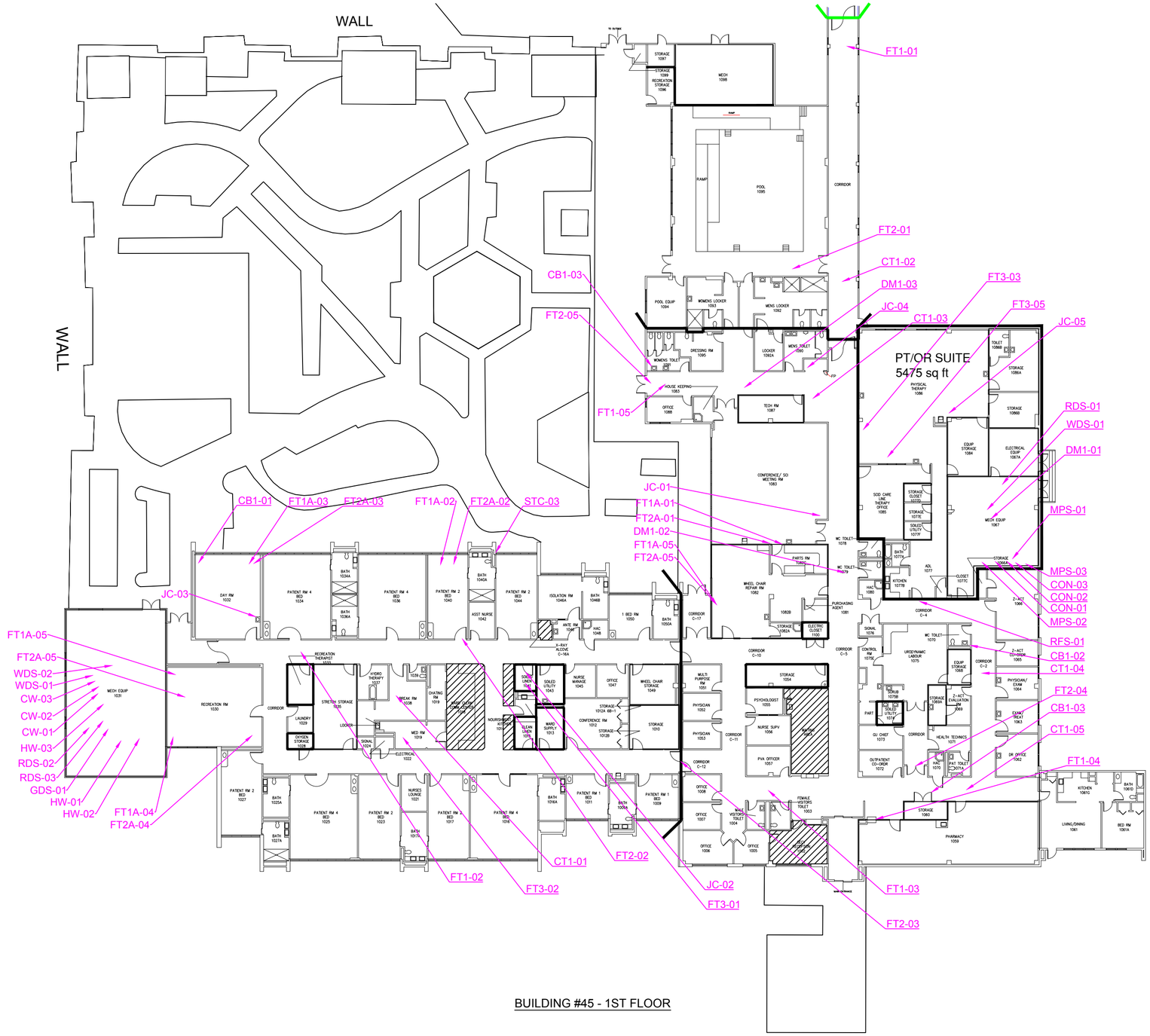
PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA43-2.0-AL



BUILDING #45 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 10 20 40

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 45
ACM SAMPLE LOCATIONS

PROJECT #

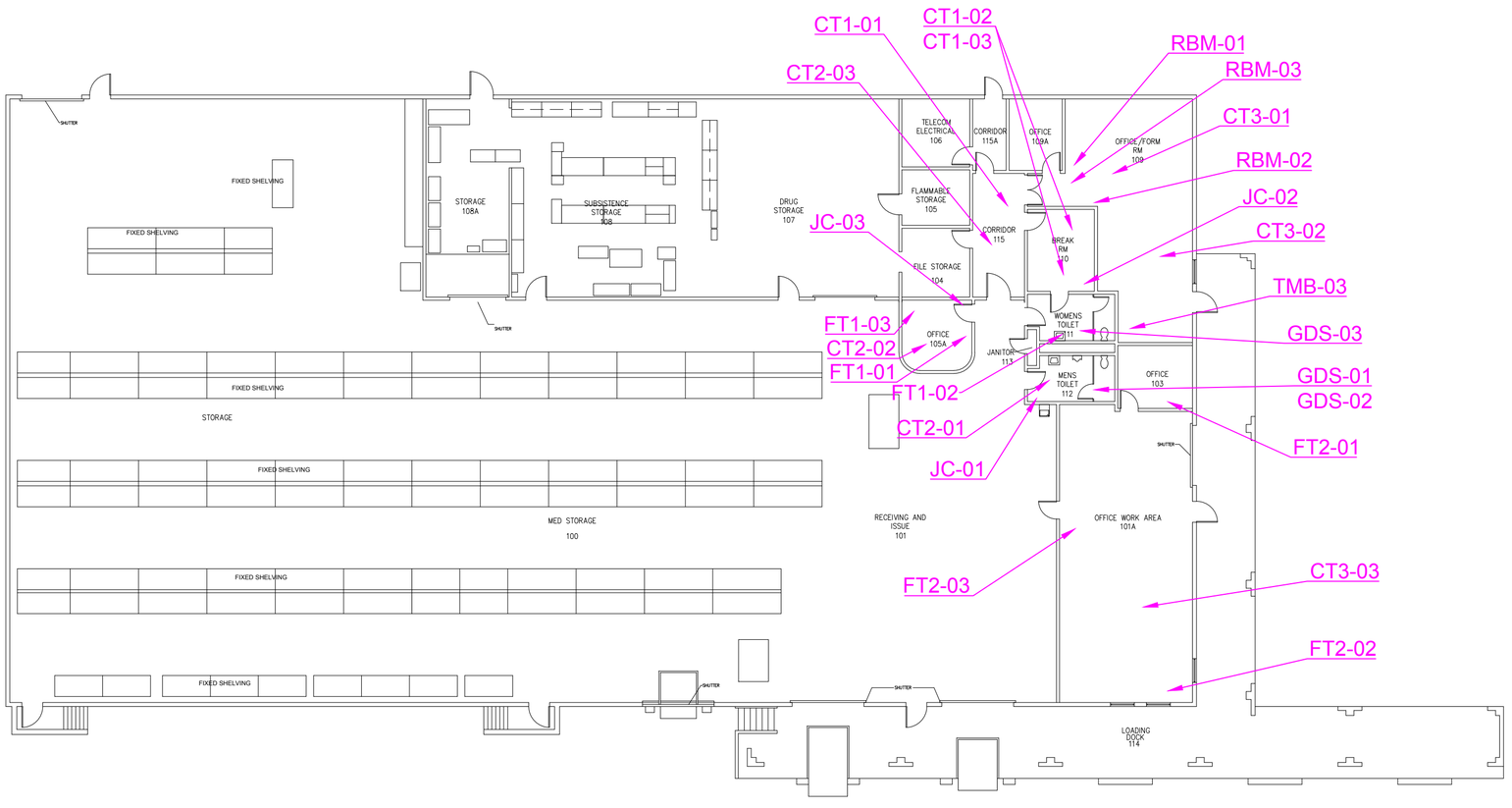
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA45-1.0



BUILDING #46 - 1ST FLOOR

LEGEND

CT-01 - ACM SAMPLE LOCATION

0 40 80 120 240

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

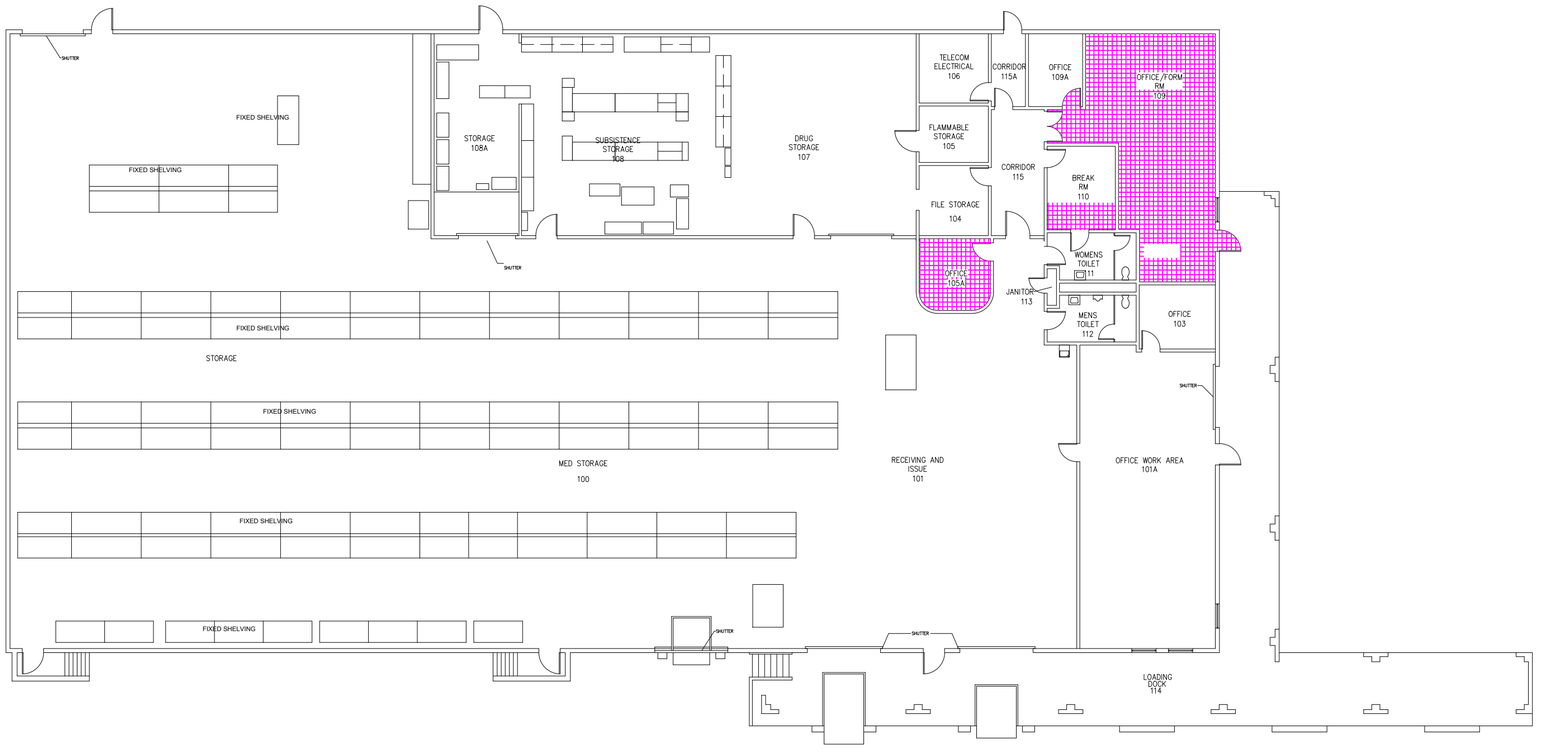
BUILDING 46
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA46-1.0



BUILDING #46 - 1ST FLOOR ACM LOCATIONS

TSI

MISCELLANEOUS

SURFACING MATERIAL

0 40 80 120 240
GRAPHICAL SCALE (FT)

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HOUSTON, TEXAS 77054

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713.585.7049 FAX

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OTHER OFFICES:

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PROJECT:

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

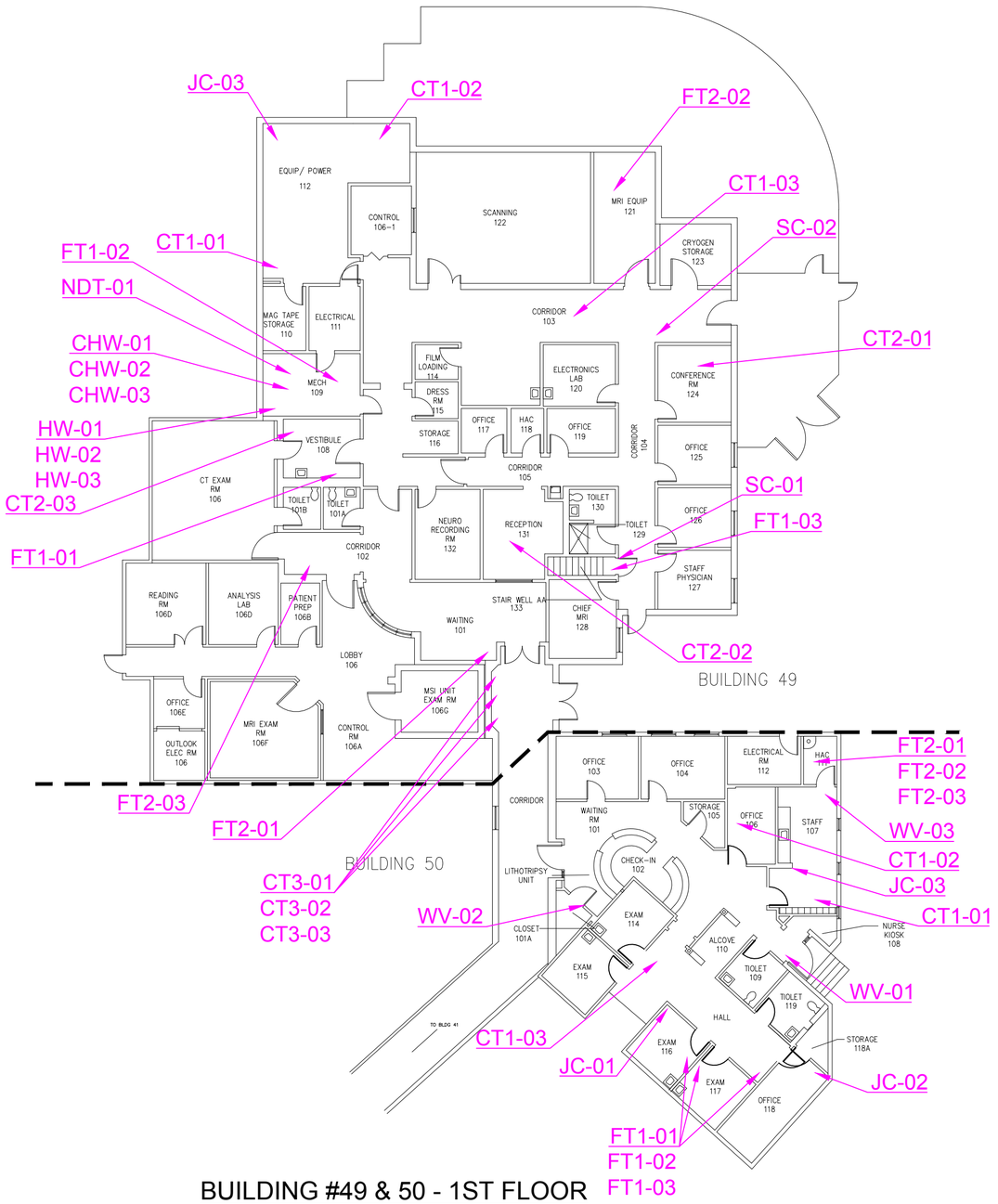
BUILDING 46
ACM LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA46-1.0-AL



BUILDING #49 & 50 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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ALBUQUERQUE, NM 87108

SHEET TITLE:

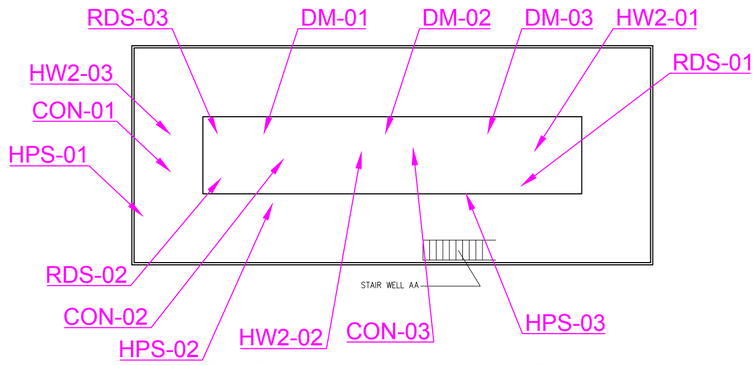
BUILDING 49/50
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA49/50-1.0



BUILDING #49 - 2ND FLOOR MEZZANINE

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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713.585.7049 FAX

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING 49/50
ACM SAMPLE
LOCATIONS

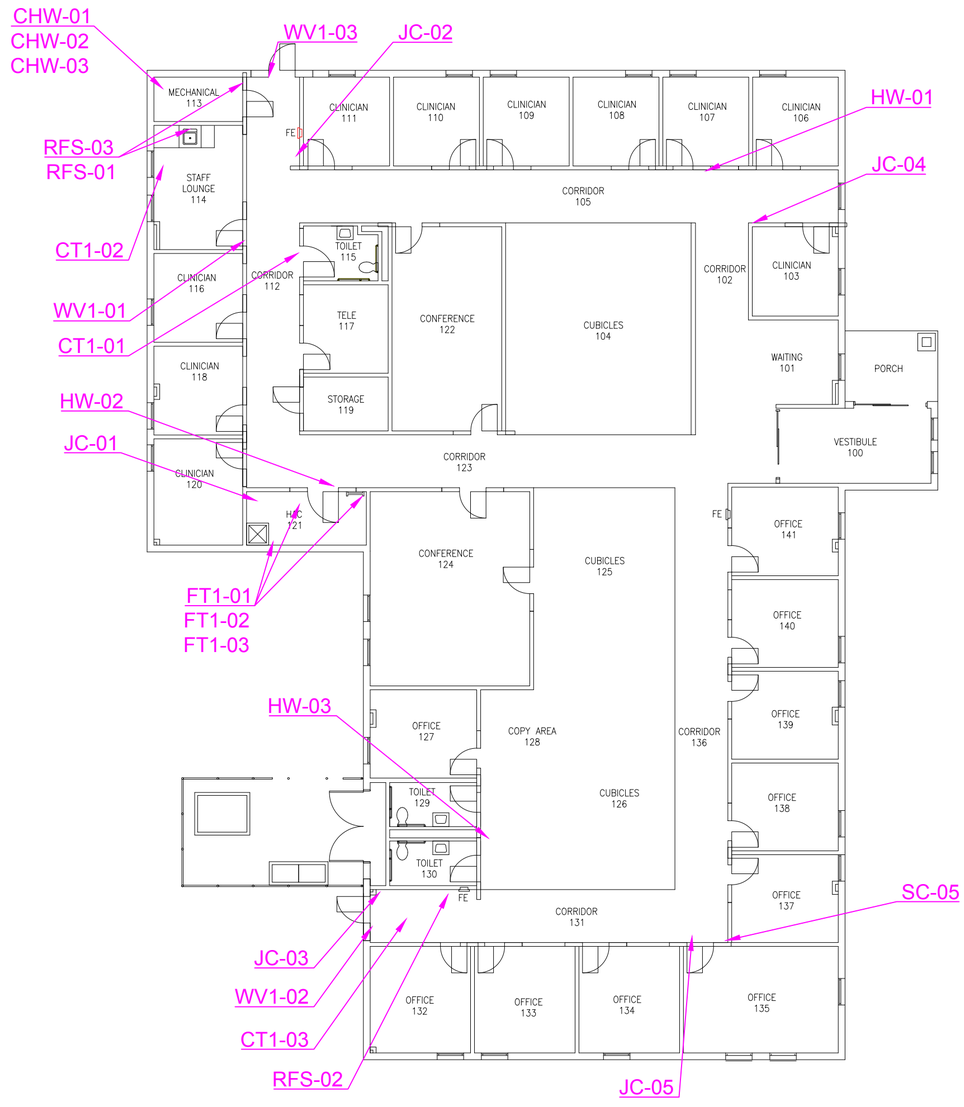
PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA49/50-1.0



BUILDING 52 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

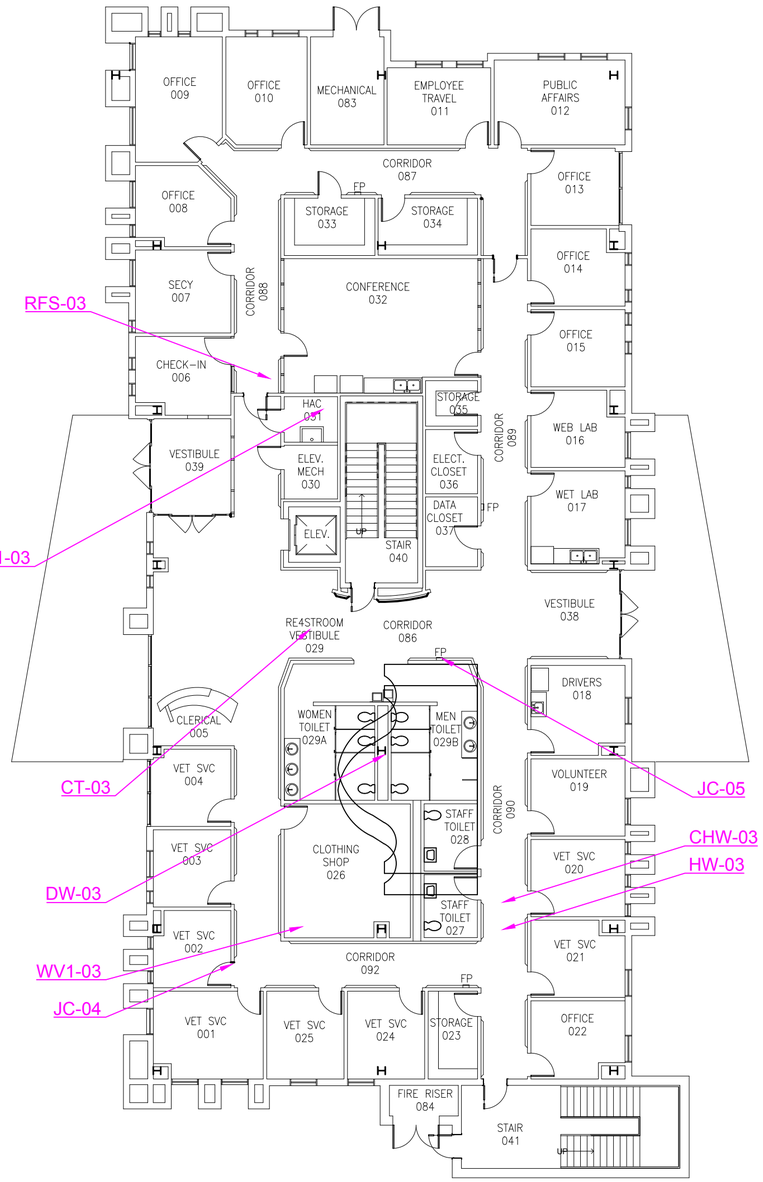
BUILDING 52
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA52-1.0



BUILDING 53 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 5 10 20

GRAPHICAL SCALE (FT)

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PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

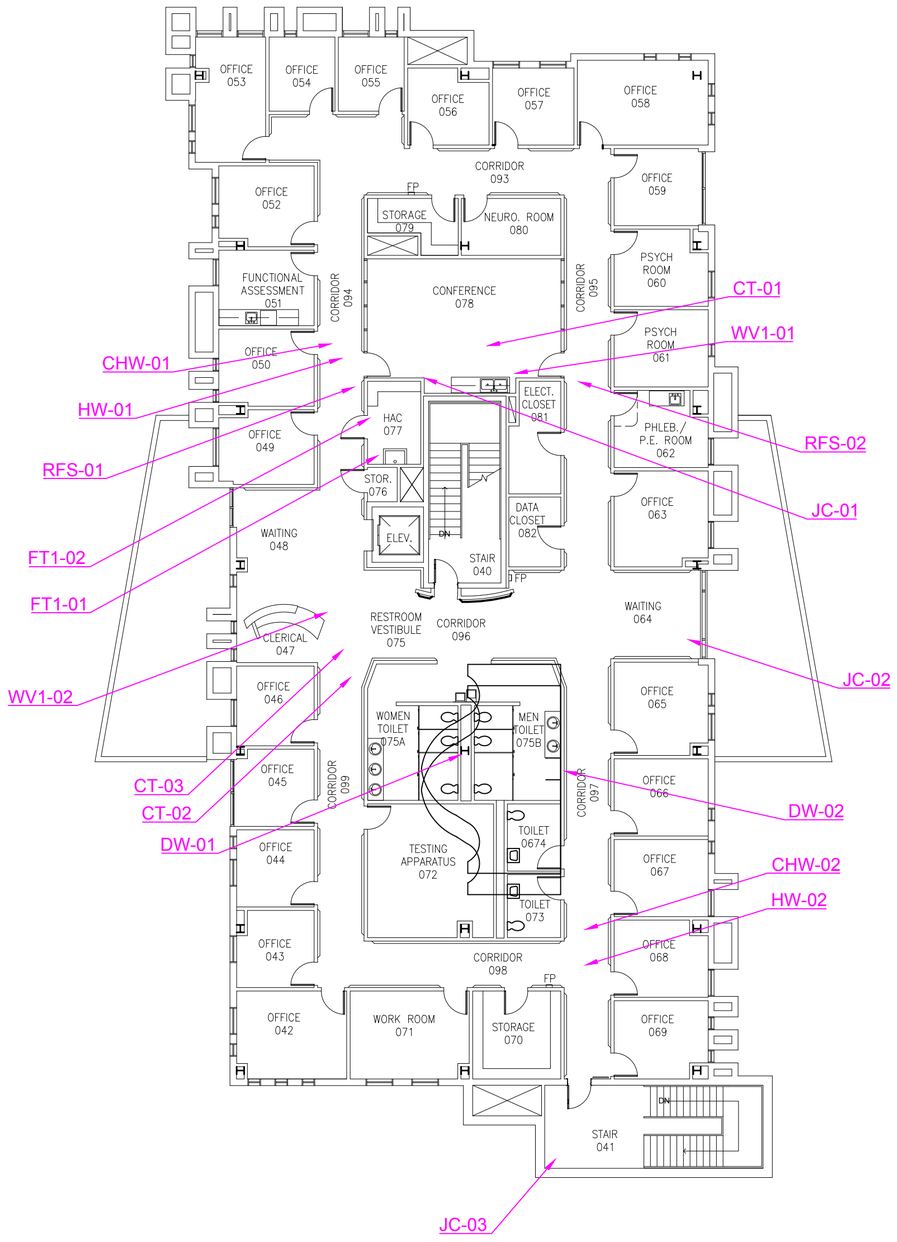
BUILDING 53
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA53-1.0



BUILDING 53 - 2ND FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

GRAPHICAL SCALE (FT): 0 5 10 20

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ALBUQUERQUE, NM 87108

SHEET TITLE:

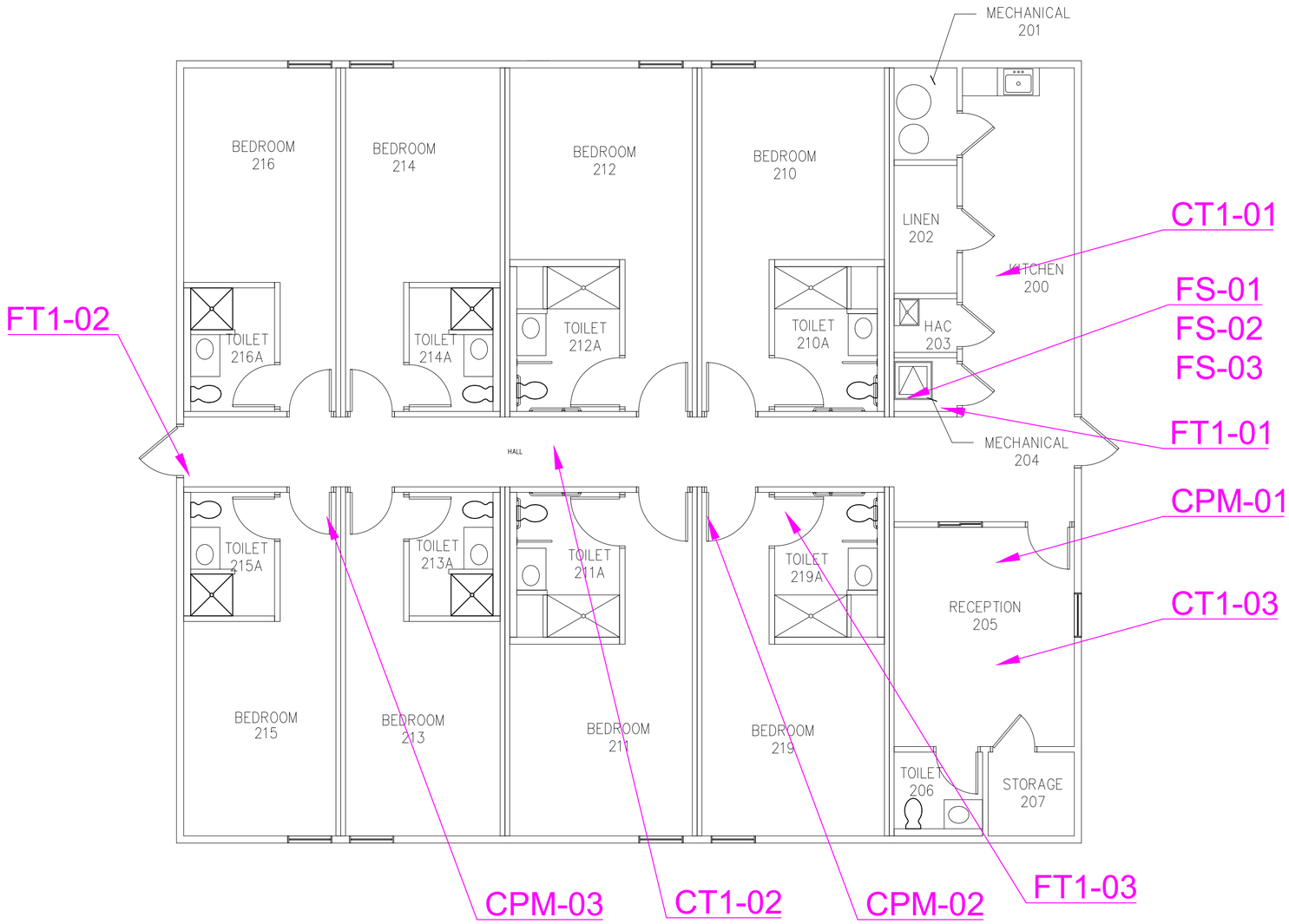
BUILDING 53
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA53-2.0



BUILDING 54 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

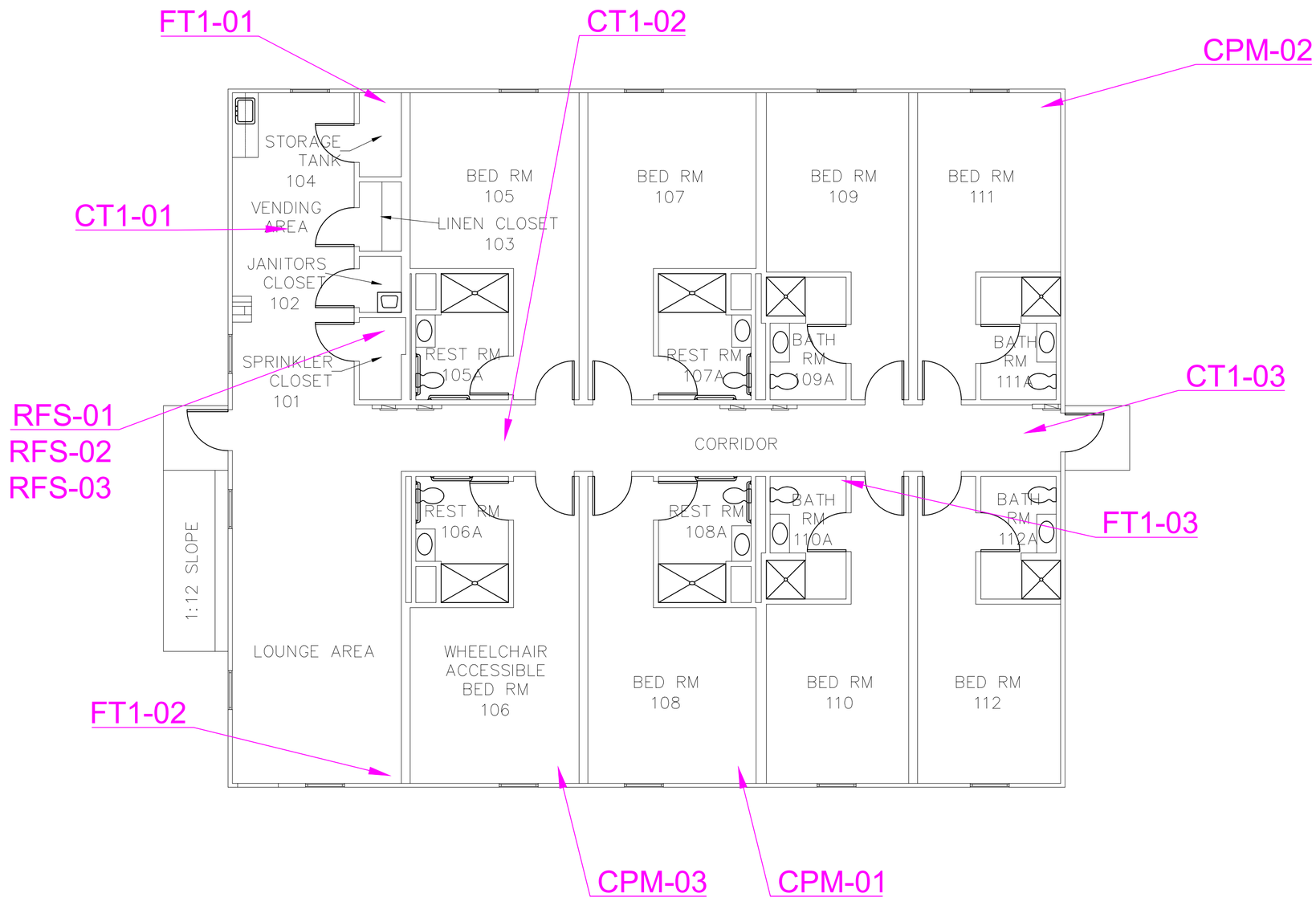
BUILDING 54
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA54-1.0



BUILDING 55 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

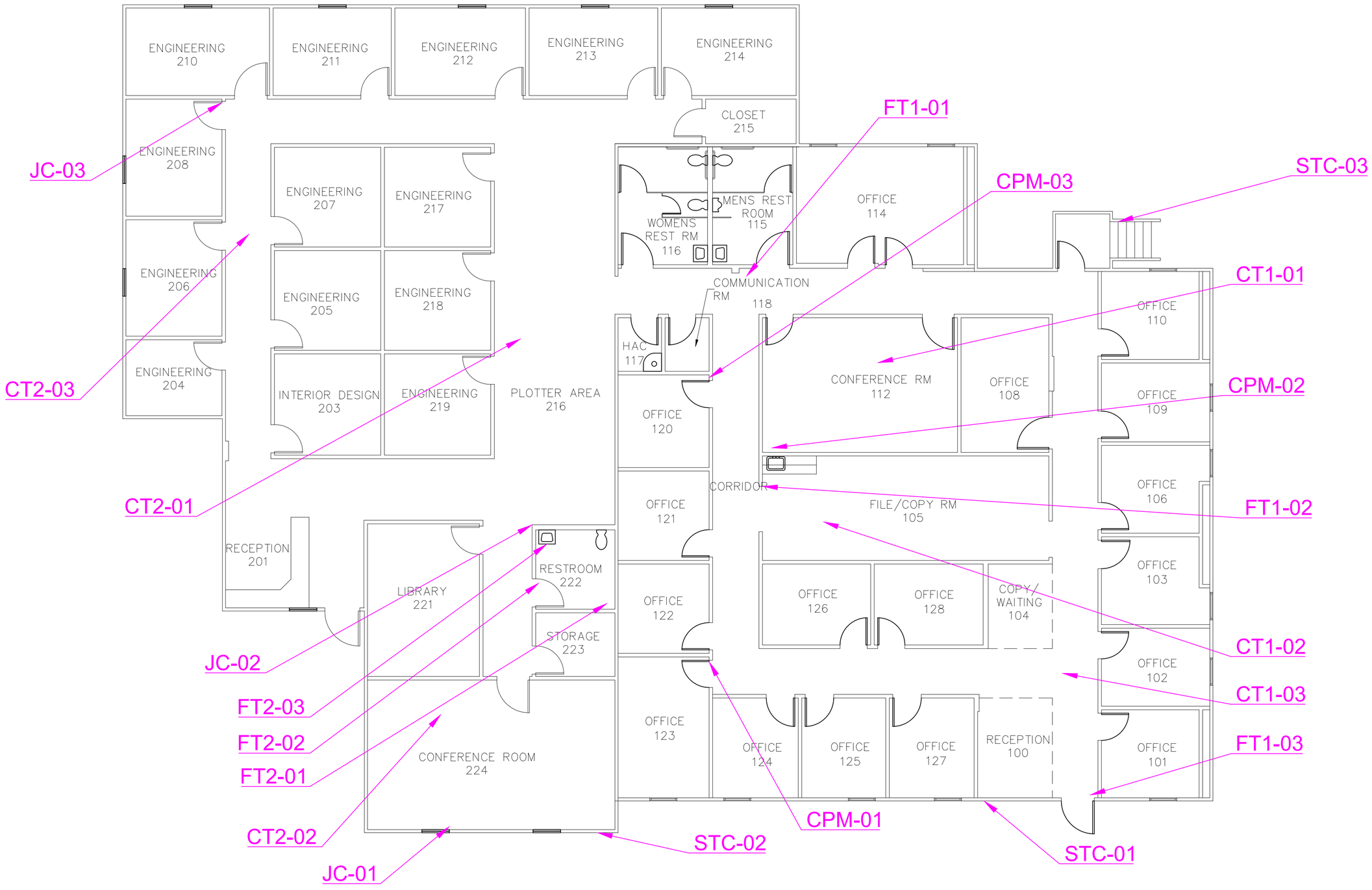
BUILDING 55
ACM SAMPLE LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA55-1.0



BUILDING 56 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 56
ACM SAMPLE
LOCATIONS

PROJECT #
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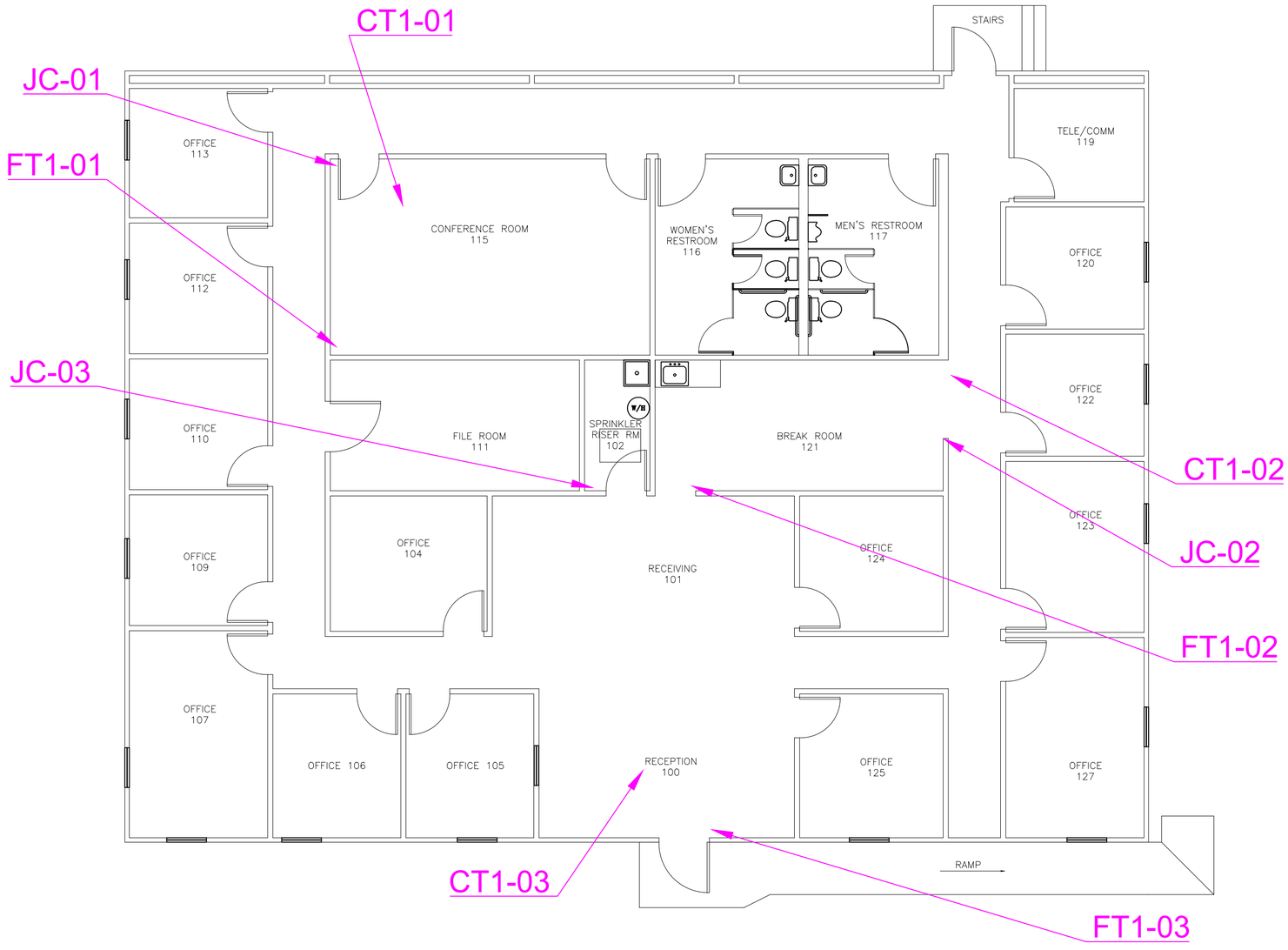
DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA56-1.0



BUILDING 66 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 66
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
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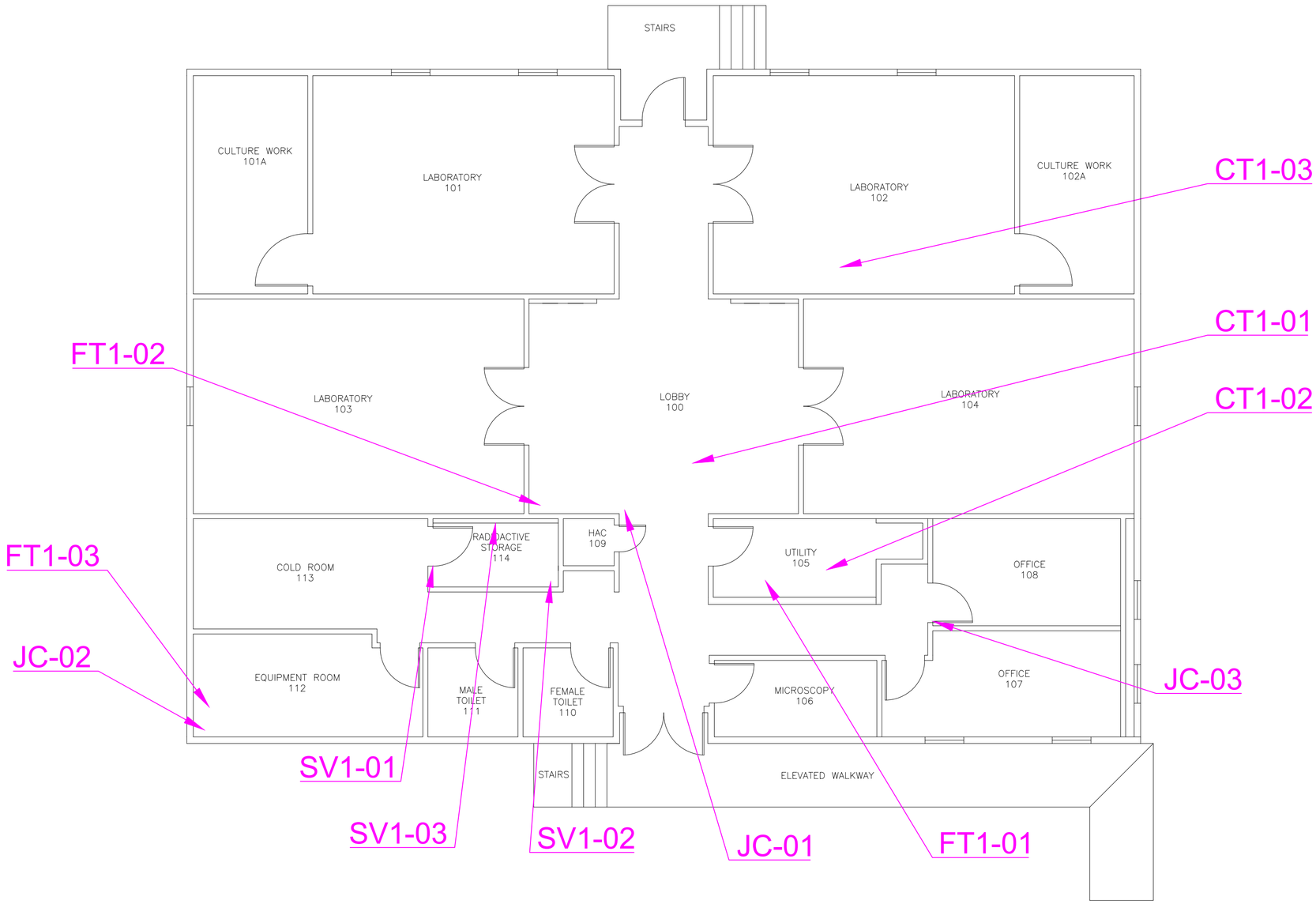
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA66-1.0



BUILDING 67 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 67
ACM SAMPLE
LOCATIONS

PROJECT #
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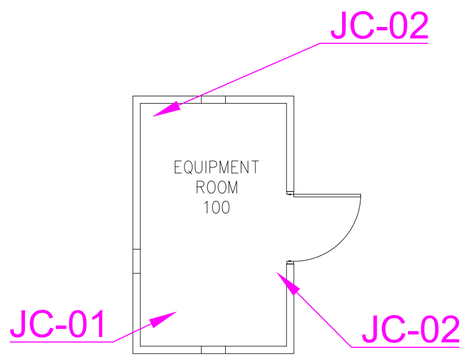
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET

NMVA67-1.0



BUILDING 67A - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING 67A
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

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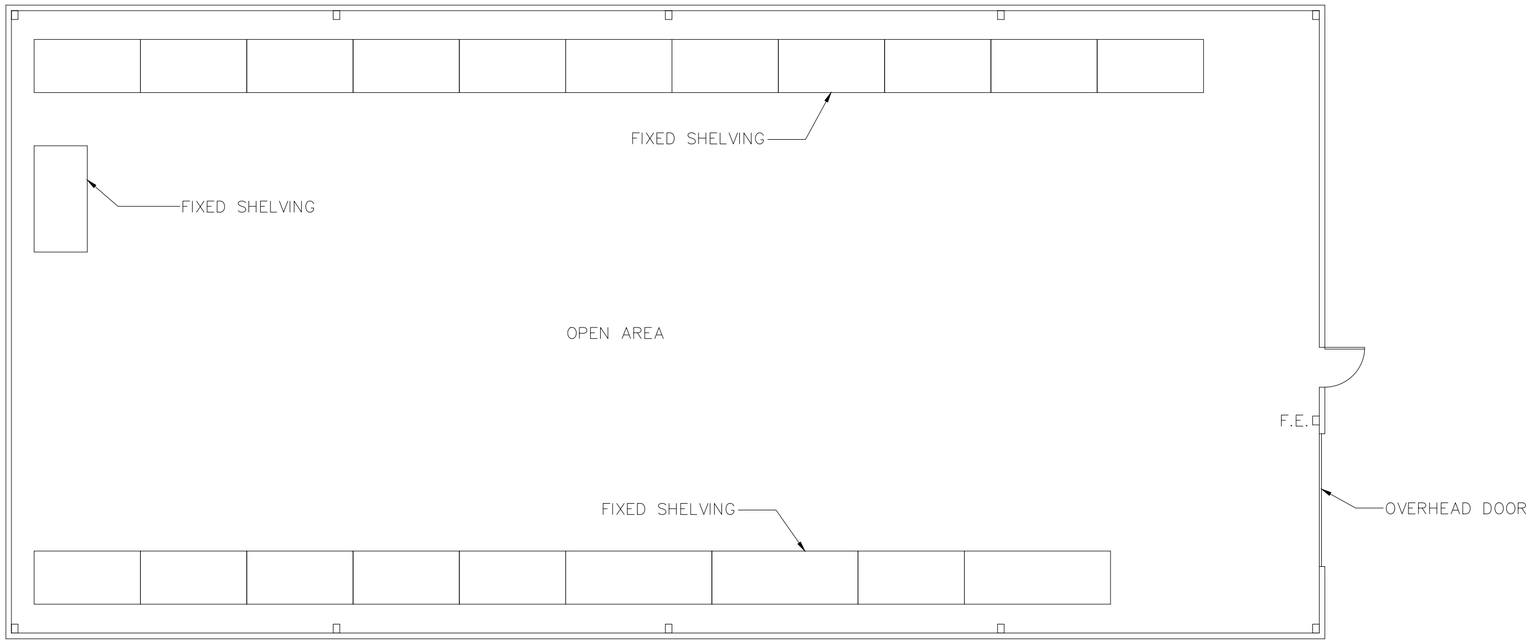
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVA67-1.0A



BUILDING T3 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10

GRAPHICAL SCALE (FT)

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SHEET TITLE:

BUILDING T3
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
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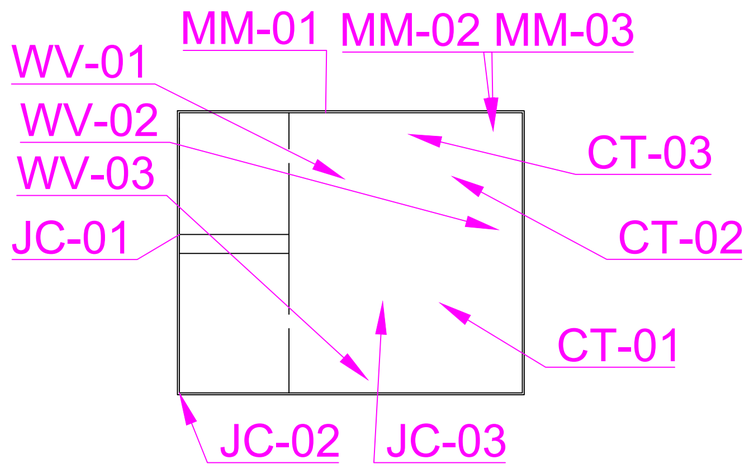
REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT3-1.0



BUILDING T15C - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 10 20 30 60

GRAPHICAL SCALE (FT)

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SHEET TITLE:

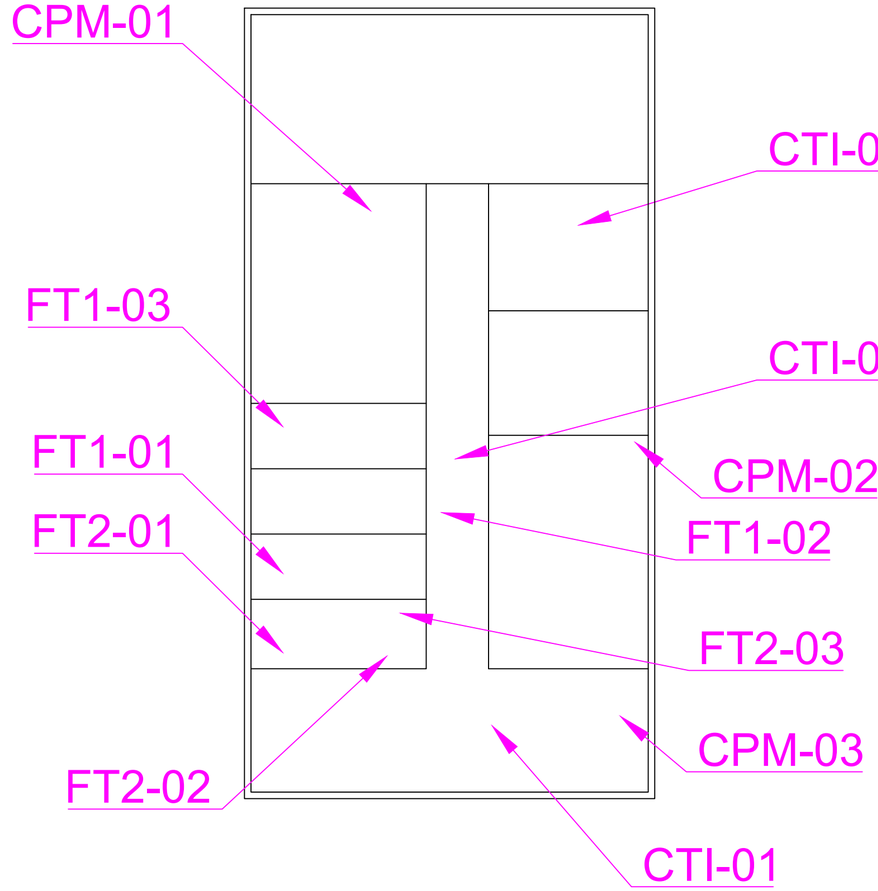
BUILDING T15C
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT15C-1.0



BUILDING T15D - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 10 20 30 60

GRAPHICAL SCALE (FT)

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SHEET TITLE:

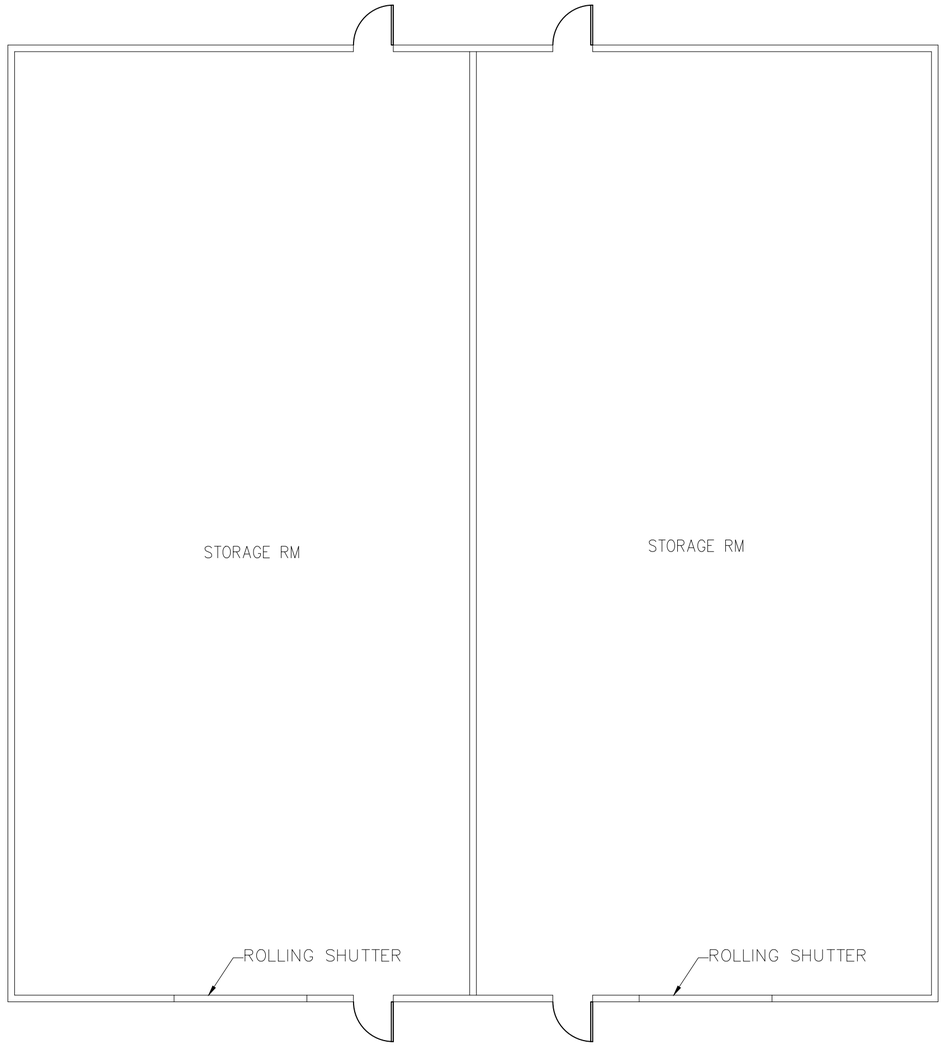
BUILDING T15C
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT15C-1.0



BUILDING T51 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 10
GRAPHICAL SCALE (FT)

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SHEET TITLE:

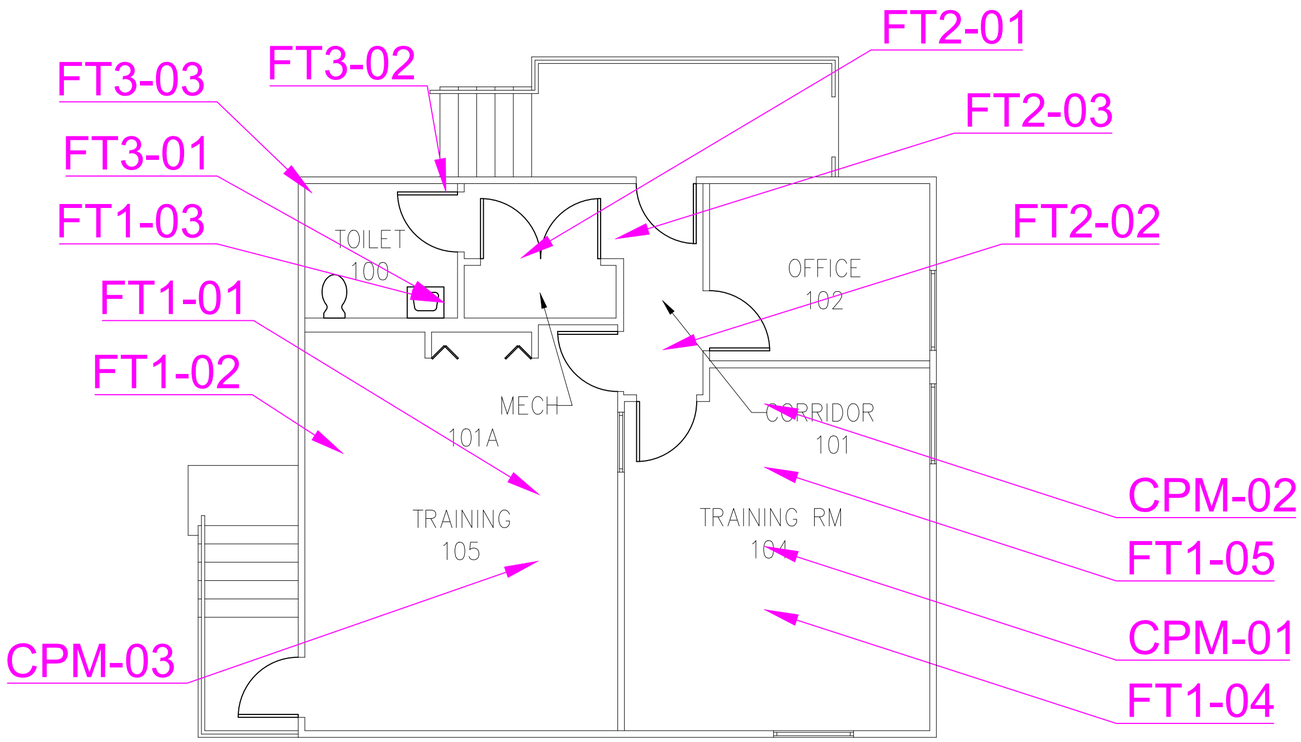
BUILDING T51
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT51-1.0



BUILDING T60 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 7.5 15

GRAPHICAL SCALE (FT)

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SHEET TITLE:

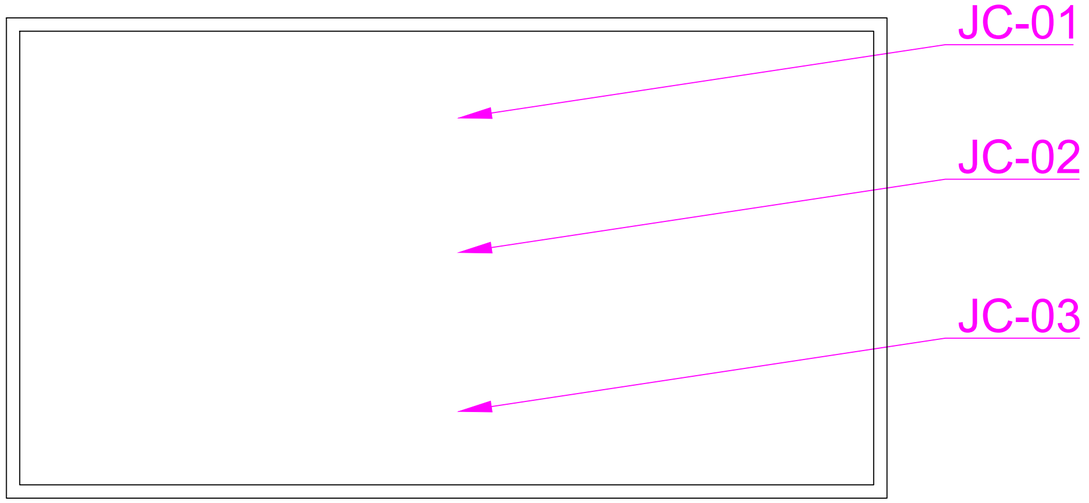
BUILDING T60
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT60-1.0



BUILDING T72 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 7.5 15

GRAPHICAL SCALE (FT)

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1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

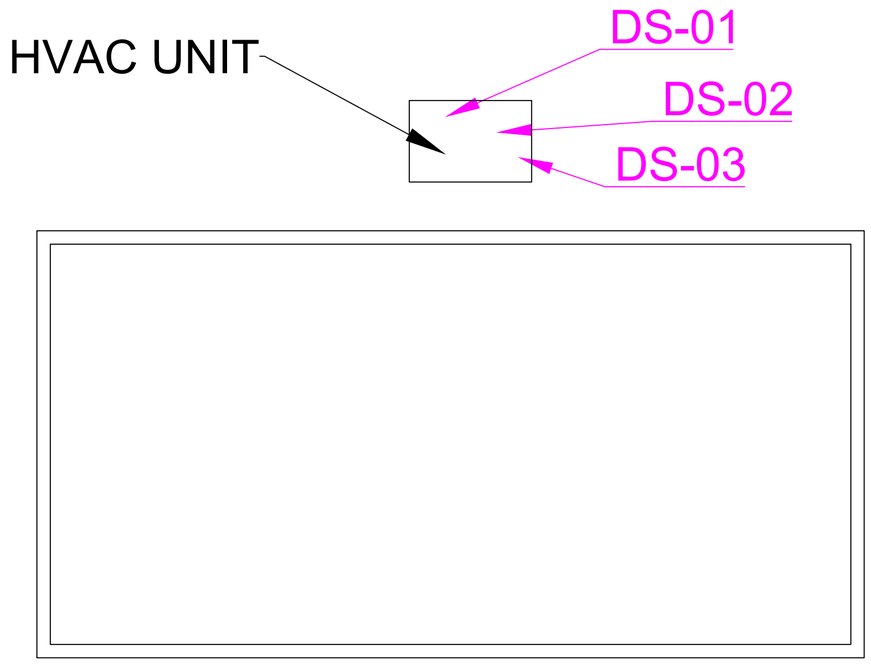
BUILDING T72
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT72-1.0



BUILDING T74 - 1ST FLOOR

LEGEND

CLK-03 - ACM SAMPLE LOCATION

0 2.5 5 7.5 15

GRAPHICAL SCALE (FT)

MEC^X, INC.
8864 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

713.585.7000 PH.
713.585.7049 FAX

WWW.MECX.NET

OTHER OFFICES:

CHICAGO, IL

DENVER, CO

A SERVICE-DISABLED VETERAN OWNED SMALL BUSINESS

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NOTES:

DRAWING TO BE USED IN CONJUNCTION WITH ASSOCIATED REPORT.

PROJECT:

RAYMOND G. MURPHY VA MEDICAL CENTER
1501 SAN PEDRO SE
ALBUQUERQUE, NM 87108

SHEET TITLE:

BUILDING T74
ACM SAMPLE
LOCATIONS

PROJECT #
1244.019E.00

DRAWN:	ELE
CHECKED:	

REV.NO.	DATE
ORIGINAL	10/05/2015

SHEET
NMVAT74-1.0

APPENDIX B

ASBESTOS PROJECT DOCUMENTATION FORMS

FORM M-1

REPORT OF DAMAGED ACM/PACM

1. Report Filed By:

   Name: _____ Date: _____

   Position: _____ Phone: _____

2. Damage Area Involved (Room Number or Description of Area Involved):

   _____

   _____

   _____

3. Exact Location of Damaged ACM/PACM:

   _____

4. Type of ACM/PACM:

5. Assessment of Damage:

   Size of Area: _____ SF/LF, Describe Below

   a. Evidence of Physical Damage:_____
   b. Evidence of Water Damage:_____
   c. Evidence of Delamination Other Damage:_____
   d. Degree of Accessibility of Material:_____
   e. Degree of Activity Near the Material: _____
   f. Location in an air plenum, air shaft, or air stream: _____
   g. Other observations (including the condition of the encapsulant or enclosure, if any):_____

      _____

   Response Necessary: ____ No; ____ Yes, Describe Recommended Action:_____

   _____

6. Cause of Damage (if known): _____

_____

RETURN TO FACILITY ASBESTOS COORDINATOR

Date Received: _____ Date Inspected: _____

Response Priority: _____ (1= highest, 3 = lowest)

Planned Response Action: _____

Response Assigned to: _____

Signed: _____ Date: _____

Asbestos Program Coordinator

Form M-2

PERIODIC SURVEILLANCE OF ACM/PACM
Raymond G. Murphy VAMC

ALBUQUERQUE, NEW MEXICO

This form is to be completed by the Asbestos Consultant during the triennial periodic surveillance and assessment of ACM. One form is to be completed for each type of material. Additional forms will be completed for each material of the same type that has a different condition assessment.

Building Area Inspected:

_____Building _____Floor _____Room/Area

Type of ACM/PACM:

_____Acoustical Ceilings _____Wallboard _____Roofing _____Flooring

_____Pipe Insulation

Assessment:

		Yes	No	Quantity
1.	Evidence of Physical Damage	_____	_____	_____
2.	Evidence of Water Damage	_____	_____	_____
3.	Evidence of Other Damage	_____	_____	_____
4.	Material Accessibility	_____	_____	_____
5.	Location to Direct Air Stream	_____	_____	_____

Comments:

Asbestos Consultant Verification

I certify that I performed the above surveillance and have updated Appendix A of the O&M program based on this surveillance.

Name:_____

Signature:_____

State Certification #:_____

APPENDIX C

APPLICABLE REGULATORY REQUIREMENTS

APPLICABLE REGULATORY REQUIREMENTS

The following is a list of federal environmental regulations which apply to asbestos materials in commercial buildings and that apply to the NMVAHCS. These regulations are discussed below for informational purposes.

A. OSHA ASBESTOS STANDARD

A building which is known to contain asbestos materials is potentially affected by the Occupational Heath and Safety Administration (OSHA) Asbestos Standard for Construction (29 CFR 1926.1101)

The building owner (or operator) must determine if common maintenance and/or renovation operation could expose workers and/or occupants to airborne fibers during performance of the maintenance and/or renovation activities. If so, he must then conduct representative air monitoring tests to determine if the worker's personal exposure levels exceed the current OSHA Permissible Exposure Limit (PEL) of 0.1 fibers per cubic centimeter of air (f/cc). If they do not, then no further measures are required provided the activities (or methods used to perform them) do not change.

If the PEL is exceeded, the owner/operator may have to develop and implement a number of measures including employee and occupant advisement, training, record keeping and engineering measures to reduce or control exposures. These measures include:

1. Training and education of each employee including the topics of: health hazards of asbestos exposure, methods of recognizing asbestos, the relationship between smoking and asbestos in producing lung cancer, the nature of operations that could result in exposure to asbestos, safe work practices and respirator training. References for help with smoking cessation are included in Appendix E.
2. Establishment of a medical surveillance program including medical exams.
3. Air monitoring to document employee exposures.
4. Maintenance of complete written records of actions taken in accordance with 1926.1101 (k).
   If the exposure levels are above the OSHA PEL of 0.1 f/cc, then additional measures must be developed and implemented to reduce exposures to below 0.1 f/cc as soon as possible. These can involve:

1. Use of respirators and establishment of a formal written respirator plan.
2. Use of HEPA-filtered exhaust ventilation.
3. Installation of temporary or permanent worker decontamination facilities.
4. Isolating work areas and posting access restriction/warning signs.

Current OSHA compliance inspection activities are focusing on companies that manufacture or use raw asbestos products and on asbestos removal contractors. OSHA is also required to formally investigate complaints that may be received from employees or building occupants. For this reason, we recommend establishment of a formal "Asbestos Management Program". The program development would include specific written procedures on how to safely perform common maintenance and renovation activities affecting the asbestos materials, training of maintenance personnel (and advisement of other occupants) and performance of appropriate air monitoring to document your compliance.

B. OSHA'S SHORT-TERM STANDARD TO PROTECT WORKERS EXPOSED TO ASBESTOS

After reviewing the record developed for the 1986 asbestos standard, OSHA determined that asbestos exposures permitted under that standard still posed a "significant risk" to workers. This risk is reduced by adopting the short-term limit on exposure. The standard of 1 f/cc over 30 minutes is "the lowest feasible short-term limit which can be reliably measured for the purposes of the OSHA Compliance Programs." Workers exposed to asbestos at concentrations greater than 1 f/cc for longer than 30 minutes must be protected from exposure under Rule 53 CFR 35610, issued September 14 by OSHA.

The Rule, which became effective October 14, 1988, will require employers to adopt engineering controls to prevent exposure, or provide respiratory and other protection whenever workers' exposure reaches this short-term excursion limit.

The new standard was added October 11, 1994, to existing OSHA regulations that protect workers exposed to an average of more than 0.1 f/cc over an eight-hour work day.

C. USEPA ASBESTOS NESHAP REGULATIONS

USEPA considers asbestos a hazardous air pollutant and regulates its emission to the atmosphere, i.e., to outside of a building under the Clean Air Act of "National Emission Standards for Hazardous Air Pollutants" (NESHAP) (40 CFR Part 61, Subpart M), Basically, the regulation does not apply to potentially hazardous situations inside a building. However, it does dictate that there will be "no visible emission of asbestos fibers to the atmosphere" and enforces this requirement by specifying:

1. Air pollution control devices for firms which mine or manufacture asbestos products, or that remove asbestos insulation materials.
2. Safe methods and controls for removing asbestos materials prior to demolishing or renovating a structure and packaging and disposing the resulting waste; and
3. Pre-notification to USEPA (or a state agency having approved jurisdiction for USEPA) prior to performing the above demolition or renovation activities if they require removal of asbestos.

This regulation therefore mainly dictates how asbestos removal work must be performed by a Contractor, or how asbestos fibers are controlled during a renovation, demolition, or construction activity and proper transit and disposal of ACM/PACM.

Under a closely related federal law, the Toxic Substance Control Act, USEPA has mandated that school buildings be inspected for asbestos (the so-called "School Asbestos Rule"). It has also recently banned essentially all uses of asbestos-containing materials and published a number of guidance documents on how to assess hazardous conditions in buildings and perform various abatement actions.

D. REGULATORY CONTACTS

1. USEPA, Region VI
   South Central
   (800) 887-6063
2. New Mexico Environmental Department – Asbestos Program

   AIR QUALITY BUREAU
   525 Camino de los Marquez, Suite 1
   Santa Fe, New Mexico, 87505-1816
   New Mexico Asbestos Hotline Is 1-800-224-7009
   Albuquerque Environmental Health Department at (505) 768-2600

APPENDIX D

GLOSSARY OF ASBESTOS TERMS

GLOSSARY OF ASBESTOS TERMS

Abatement - procedures physically taken to control fiber release from asbestos-containing materials/presumed asbestos-containing materials (ACM/PACM). This includes removal, encapsulation, enclosure and repair.

ACBM - Asbestos-Containing Building Material(s)

Accessible ACM/PACM - ACM/PACM which is subject to disturbance by building occupants or custodial or maintenance personnel in the course of their normal activities.

ACM/PACM – Asbestos-Containing Material(s)/Presumed Asbestos-Containing Material(s)

Aggressive Sampling - Air sampling which takes place after final clean-up while the air is being physically agitated to produce a "worst case" scenario.

AHERA - The Asbestos Hazard Emergency Response Act of 1986. A federal law requiring the identification and abatement of asbestos hazards in schools. This act also set training standards for individuals performing asbestos-related tasks.

Air Lock - A system of enclosures consisting of two polyethylene curtained doorways at least three feet apart that does not permit air movement between clean and contaminated areas.

Air Monitoring - The process of measuring the airborne fiber concentration of a specific quantity of air over a given amount of time.

Amended Water - Water to which a chemical wetting agent (surfactant) has been added to improve penetration into asbestos-containing materials.

Approved Landfill - A site for the disposal of asbestos-containing and other hazardous wastes that has been given State or Municipal approval.

Area Air Sampling - any form of air sampling or monitoring where the sampling device is placed at some stationary location.

Asbestos - any hydrated mineral silicate separable into commercially usable fibers including, but not limited to, chrysotile (serpentine), amosite (cummingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

Asbestos Containing Material (ACM/PACM) - any material that contains more than one percent asbestos by weight.

Asbestos Containing Waste Material - asbestos-containing material or asbestos-contaminated objects requiring disposal.

Clearance Air Monitoring - the employment of sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement activity.

Clearance Criteria - an established level of acceptance for declaring an area that has undergone asbestos abatement work environmentally safe for reoccupancy.

Critical Barriers - sealed boundaries of the work area, existing or created, to prevent flow of asbestos contamination to air outside the work area. Examples include: sealed doors, windows, vent openings, HVAC supply and return. Common seals used are polyethylene, plywood, foam board and duct tape.

Curtained Doorway - a device which consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side and the third sheet at the top and left side. Sheets of plastic shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

Decontamination Enclosure System or Facility - a series of connected rooms or chambers, separated from the work area and from each other by air locks, for the decontamination of workers, materials, waste containers and equipment.

Disposal Bag - a 6 mil. thick, leak-tight plastic bag used for transporting asbestos waste from the work site to the disposal site. Disposal bags should contain the required warning, which is permanently embossed or attached to the bag as a label.

Encapsulant (Mastic) or Encapsulating Agent - a liquid material which can be applied to asbestos-containing material (ACM/PACM) and which temporarily controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). This may also be used to seal surfaces from which ACM/PACM has been removed.

Encapsulation - the treatment of asbestos containing materials with a penetrating or surface Mastic in order to minimize the potential for asbestos fiber release.

Enclosure - An airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

EL - Excursion Limit The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 f/cc as averaged over a sampling period of thirty (30) minutes.

F/CC - Fibers per cubic centimeter of air.

Friable Asbestos Material - any asbestos or any ACM/PACM that can be crumbled, pulverized or reduced to power when dry, by hand pressure.

Ground Fault Interrupter - A device which automatically de-energizes a high voltage system component which has developed a fault in the ground line.

HEPA Filter - a High-Efficiency Particulate Air filter capable of trapping and retaining 99.97 percent of particles (asbestos fibers) greater than 0.3 micrometers in diameter.

HEPA Vacuum Equipment - vacuuming equipment with a HEPA filter.

MSDS - Material Safety Data Sheet

MSHA - the Mine Safety and Health Administration, Approval and Certification Center, P.O. Box 251, Route 1, Philadelphia, WV 26059.

Negative Pressure - An atmosphere created in a work enclosure such that the airborne fibers will tend to be drawn through the filtration system rather than leak out into the surrounding areas. The air pressure inside the work area is less than outside the work area.

NESHAPS - the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).

NIOSH - the National Institute for Occupational Safety and Health, 200 Constitution Avenue NW, Washington, DC 20210.

NIOSH/MSHA - The official approving agencies for respiratory protective equipment who test and certify respirators.

Operations & Maintenance (O&M) - A program of specific procedures and practices developed for the interim control of asbestos-containing materials in buildings until it is removed.

OSHA - The US Department of Labor, Occupational Safety and Health Administration which was created by the Occupational Safety and Health Act of 1970; serves as the enforcement agency for safety and health in the workplace environment.

PEL - Permissible Exposure Limit of 0.1 f/cc measured over an 8 hour Time Weighted Average as stated by OSHA.

Personal Air Monitoring - a method used to determine employees' exposure to airborne fibers. The sample is collected outside the respirator in the workers' breathing zone.

Personal Protective Equipment (PPE) - appropriate protective clothing, gloves, eye protection, footwear, head gear and approved respiratory protection.

Plasticize (Poly) - to cover floors and walls with plastic sheeting or by using spray plastics to seal the work area.

Qualitative Fit Test - the individual test subjects responding to a chemical challenge outside the respirator facepiece. The three OSHA - approved methods are: 1) irritant smoke test; 2) odorous vapor test; 3) taste test.

Quantitative Fit Test - exposing the respirator wearer to a test atmosphere containing an easily detectable, nontoxic aerosol vapor or gas as the test agent. Instrumentation, which samples the test atmosphere and the air inside the facepiece of the respirator, is used to measure quantitatively the leakage into the respirator. There are a number of test atmospheres, test agents and exercises to perform during the tests.

Removal - the stripping of asbestos containing materials from surfaces or components of a facility or the removal of structural components.

Respirator Program - A written program established by an employer which provides for the safe use of respirators on the job site.

Repair - The action of returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

Response Action - Method, including removal, encapsulation, enclosure, repair and operations and maintenance, that protects human health and the environment from friable ACM/PACM.

Routine Maintenance Area - An area, such as a mechanical room, that is not normally frequented by occupants and in which maintenance employees or contract workers regularly conduct maintenance activities.

Surfactant - the chemical wetting agent added to water to improve the capability of penetration, thus reducing the quantity of water needed during abatement.

Time Weighted Average (TWA) - the average concentration of a contaminant measured in the air during a specific time period.

USEPA - the United States Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460.

Visible Emissions - any emissions containing particulate asbestos material that is visually detectable without the aid of instruments.

Wet Wiping - the method of eliminating asbestos containing material from surfaces and objects using cloths, mops or other cleaning utensils dampened with water. Such items are disposed of as asbestos-contaminated waste and are handled accordingly.

Work Area - designated rooms, spaces, or areas of the building or structure where asbestos abatement takes place.

Work Site - the premises where asbestos abatement activity is taking place.

APPENDIX E

SMOKING CESSATION INFORMATION

SMOKING CESSATION INFORMATION

29 CFR 1926.1101

The following organizations provide smoking cessation information.

1. **THE NATIONAL CANCER INSTITUTE**

   Public Inquires Office

   National Cancer Institute

   6116 Executive Boulevard

   Building 31, Room 3036A

   Bethesda, MD 20892-8322
   Cancer Information Service (CIS) 1-800-4-CANCER

2. **THE AMERICAN CANCER SOCIETY**

   American Cancer Society
   Albuquerque New Mexico
   5800 Lomas Blvd NE
   (505) 260-2105

The American Cancer Society (ACS) is a voluntary organization composed of 13 divisions and 3,400 local units. ACS helps people learn about the health hazards of smoking and become successful ex-smokers.

3. **THE AMERICAN HEART ASSOCIATION**

   American Heart Association
   2201 San Pedro Dr NE, Albuquerque, NM 87110
   (505) 353-5800

The American Heart Association (AHA) is a voluntary organization with 130,000 members (physicians, scientists and lay persons) in 56 state and regional groups. AHA produces a variety of publications and audiovisual materials about the effects of smoking on the heart. AHA also has developed a guidebook for incorporating a weight control component into smoking cessation programs.

4. **THE AMERICAN LUNG ASSOCIATION**

American Lung Association
Albuquerque New Mexico
5911 Jefferson St NE, Albuquerque, NM 87109
(505) 265-0732

A voluntary organization of 7,500 members (physicians, nurses and lay persons), the American Lung Association (ALA) conducts numerous public information programs about the health effects of smoking. ALA has 59 state and 85 local units. The organization actively supports legislation and information campaigns for non-smokers' rights and provides help for smokers who want to quit, for example, through "Freedom From Smoking," a self-help smoking cessation program.

5. **CENTERS FOR DISEASE CONTROL AND PREVENTION**

Office on Smoking and Health
Centers for Disease Control and Prevention
1 (800) 232-4636
Consult your local telephone directory for listings of local chapters.

APPENDIX F

ALTEC TESTING & ENGINEERING ASBESTOS O&M PLAN

Altec Testing & Engineering, Inc.

ASBESTOS-CONTAINING MATERIALS
OPERATIONS & MAINTENANCE (O&M) PLAN

April 2010

for:

Raymond G. Murphy VA Medical Center
1501 San Pedro SE
Albuquerque, NM 87108

Covering:

Building Nos.
1, 1-Annex, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 18, 32, 33, T35, T35A, T38A, T38B, 39, T46, 57, 58, T59, 60, 61, X61, 62, X62, 63, & 65

Prepared by:

Altec Testing & Engineering, Inc.
6035 Fremont Street
Riverside, CA 92504
951.352.6510

On Behalf of:

ADVANCED ENVIRONMENTAL SERVICES, INC.

7 Amato
Mission Viejo, CA 92692
949.454.2646

TABLE OF CONTENTS

1.0 FACILITY INFORMATION & ASBESTOS INVENTORY 5

1.1 FACILITY INFORMATION 5
1.2 ASBESTOS-CONTAINING MATERIAL INVENTORY 7
1.3 ASBESTOS-CONTAINING MATERIAL DEFINITION 7

2.0 O&M PLAN DESCRIPTION 10

2.1 PLAN OBJECTIVES 10
2.2 LAYING THE GROUNDWORK FOR AN EFFECTIVE O&M PROGRAM 11
2.3 APPLICABLE REGULATIONS 13
2.4 AGENCY NOTIFICATION REQUIREMENTS 13
2.5 DEFINITIONS OF ASBESTOS RELATED TERMS 14

3.0 EMPLOYEE TRAINING & RESPONSIBILITIES 25

3.1 OSHA JOB CLASSIFICATIONS 25
3.2 TRAINING COURSES 26
3.3 O&M PROGRAM PARTICIPANTS 26

4.0 O&M PLAN COMPONENTS 31

4.1 PROCEDURES 31
4.2 SCHEDULED O&M INSPECTIONS 31
4.3 O&M WORK RECORDS/INSPECTION FORMS 31
4.4 DESIGN AND USE OF PROJECT LOGBOOKS 34
4.5 OSHA RECORDS AND REQUIREMENTS 36
4.6 MEDICAL RECORDS 37
4.7 SAMPLING RECORDS 37
4.8 DISPOSAL RECORDS 41

5.0 SPECIALIZED TOOLS & EQUIPMENT 42

5.1 HEPA VACUUMS 42
5.2 NEGATIVE PRESSURE FILTRATION DEVICES 43
5.3 AMENDED WATER 44
5.4 ENCAPSULANTS 44

6.0 PROJECT CLASSIFICATIONS & WORK PROCEDURES 46

6.1 OSHA CLASS I WORK – REMOVAL OF FRIABLE TSI & SURFACING MATERIALS 47
6.2 OSHA CLASS II WORK – REMOVAL OF CATEGORY I & II NONFRIABLES 47
6.3 OSHA CLASS III WORK – REPAIR & MAINTENANCE 47
6.4 OSHA CLASS IV WORK – CUSTODIAL WORK TO CLEAN UP ACM 57
6.5 EMERGENCY REMOVAL PROCEDURES 58
6.6 MINI ENCLOSURE PROCEDURES 59

6.7 UTILITY TUNNEL PROCEDURES 60

7.0 DECONTAMINATION PROCEDURES 63

8.0 AIR CLEARANCE - AFTER PROJECT COMPLETION 64

9.0 WASTE DISPOSAL 65

9.1 ADEQUATE WETTING 65
9.2 CONTAINERIZING 65
9.3 WASTE LOAD-OUT PROCEDURE 66
9.4 FRIABLE ASBESTOS WASTE 67
9.5 NONFRIABLE ASBESTOS WASTE 67
9.6 OTHER ACM WASTE CONSIDERATIONS 68
9.7 LIQUID ACM WASTES 69
9.8 HAZARDOUS WASTE HAULERS/DUMPS 69

10.0 CONTRACTOR OBSERVATION 70

11.0 ASBESTOS AWARENESS TRAINING INFORMATION 71

11.1 KEY TOPICS FOR AWARENESS TRAINING 71
11.2 WHAT IS ASBESTOS? 75
11.3 HISTORY OF ASBESTOS 75
11.3 THE USES OF ASBESTOS 78
11.4 DISEASES AND THE DISEASE PROCESS 79
11.5 RELATIONSHIP OF SMOKING TO ASBESTOS 81
11.6 TYPES OF ASBESTOS IN BUILDINGS 82
11.7 EMPLOYEE PROTECTION 83
11.8 LABELS AND SIGNAGE 85
11.9 MEDICAL EXAMINATION FOR O&M PERSONNEL 85
11.10 TRAINING 86
11.11 BODY PROTECTION 86
11.12 MISCELLANEOUS 87

12.0 RESPIRATORY PROTECTION 89

12.1 PURCHASE OF RESPIRATORY PROTECTION EQUIPMENT 89
12.2 MEDICAL ASPECTS OF RESPIRATORY PROTECTION EQUIPMENT USAGE 90
12.3 ISSUANCE OF RESPIRATORY PROTECTION EQUIPMENT 90
12.4 RESPIRATORY PROTECTION EQUIPMENT FITTING 91
12.5 TYPES OF FIT TESTS 91
12.6 FREQUENCY OF FIT TESTS 92
12.7 SPECIAL PROBLEMS IN RESPIRATOR FITTING 92
12.8 STORAGE OF RESPIRATORS 92
12.9 INSPECTION FOR DEFECTS 93

12.10 INSPECTION SCHEDULES 93
12.11 RECORD KEEPING FOR RESPIRATORS 93
12.12 AIR-PURIFYING RESPIRATORS 93
12.13 LOW AND HIGH TEMPERATURE 94

13.0 GENERAL HEALTH AND SAFETY AWARENESS 95

13.1 HAZARD COMMUNICATION 95
13.2 COMMON FIRST AID 96
13.3 THE NEED FOR PERSONAL PROTECTIVE EQUIPMENT 100
13.4 EYE AND FACE PROTECTION 103
13.5 HEAD PROTECTION 105
13.6 FOOT AND LEG PROTECTION 107
13.7 HAND AND ARM PROTECTION 109
13.8 BODY PROTECTION 112
13.9 HEAT STRESS 113
13.10 NOISE 117
13.11 MATERIAL HANDLING 119
13.12 LOCKOUT/TAGOUT – EQUIPMENT & ELECTRICAL SAFETY 122
13.13 FIRE SAFETY 122
13.14 FALL PROTECTION 124
13.15 HAND AND POWER TOOLS 125
13.16 CONFINED SPACES 129

Appendix A - O&M Forms

Form OM-10 DESIGNATION OF CONTROLLED AREAS AND MATERIALS
Form OM-20 NOTIFICATION OF AWARENESS TRAINING SESSION
Form OM-30 AWARENESS TRAINING SESSION RECORD
Form OM-40 CONSTRUCTION / MAINTENANCE EMPLOYEE NOTIFICATION
Form OM-50 ASBESTOS-CONTAINING MATERIALS LOCATION NOTIFICATION
Form OM-60 ASBESTOS WORK PERMIT REQUEST FORM
Form OM-70 MAINTENANCE CONTRACTOR NOTIFICATION
Form OM-80 EMPLOYEE NOTIFICATION OF AN ASBESTOS ABATEMENT PROJECT
Form OM-90 RESPIRATORY PROTECTION TRAINING RECORD
Form OM-100 QUALITATIVE FIT TEST RECORD
Form OM-110 ASBESTOS OPERATIONS AND MAINTENANCE PROJECT
Form OM-120 O&M EMERGENCY EPISODE REPORT
Form OM-130 QUARTERLY O&M INSPECTION FORM

Appendix B – Asbestos Inventory Table

1.0 FACILITY INFORMATION & ASBESTOS INVENTORY

1.1 FACILITY INFORMATION

Facility managers at the Raymond G. Murphy VA Medical Center in Albuquerque, New Mexico understand that asbestos is a hazardous substance and asbestos-containing materials (ACMs) in deteriorated or damaged condition can cause serious health effects. ACM surveys have been previously performed and ACMs have been identified within the buildings. This O&M Plan should be used in to supplement any existing O&M Plan(s).

In general, the ACMs identified by Altec Testing & Engineering, Inc. (Altec) include thermal system insulation (TSI), HVAC products, joint compound, ceiling/wall tile adhesive, vinyl floor tile/covering and flooring/carpet adhesives.

Asbestos-cement products (i.e., Transite™) and TSI are expected to be located in walls, ceiling cavities and other inaccessible or hidden areas. Some roofing materials especially roof penetration mastics are expected to contain asbestos. The roof areas were not included in the scope of work for this survey.

Altec has produced this written O&M Plan to provide continued inspection and evaluation of the condition of asbestos materials as well as establish strict procedures for all future engineering, maintenance, renovation or service contract work to be performed in the building. This program was reviewed and approved by a Certified Industrial Hygienist (CIH). The policy of the Raymond G. Murphy VA Medical Center is that ACM that is in a state of disrepair or handled improperly can present a serious threat to health.

Previous remodeling/modernization efforts throughout the facility may have included removal of some ACMs from the renovated areas. Based on information provided by Raymond G. Murphy VA Medical Center staff the following areas have been either already surveyed and/or have been renovated and were excluded from this survey:

Building 10 – First Floor - North portion
Building 10 – Second Floor - North portion

In general, these areas were excluded from the survey Altec performed in October 2009.

The following buildings at the facility were sampled for ACM. They will be referenced as “covered buildings” throughout this O&M Plan. ACM has been identified in the structures identified below. The scope of work areas included accessible interior and exterior spaces. Roofs and inaccessible interior areas (such as inaccessible crawl spaces, inaccessible wall-ceiling cavities and other inaccessible voids) in each building were not

inspected due to access restrictions. Suspect ACMs within these areas should be assumed to contain asbestos until sampling proves otherwise.

Building No.	Building Function	Year Built	Square Footage	Number of Floors	ACM Present
1	**Psychiatry**	**1932**	**71,222**	**5**	**YES**
1 - Annex	Conference/Office	1932	71,222	1	No
2	**VCS – Recreation**	**1932**	**20,000**	**2**	**YES**
3	**Psychiatry**	**1932**	**50,057**	**4**	**YES**
4	Administrative	1932	22,400	2	No
5	Engineering Shops	1932	5,700	1	No
6	Engineering Shops	1932	3,820	1	No
8	**Engineering Admin**	**1932**	**4,912**	**1**	**YES**
9	Laundry	1932	14,427	1	No
10	**Research**	**1932**	**23,000**	**3**	**YES**
11	**Research/PRRTP**	**1932**	**17,300**	**3**	**YES**
12	Research	1932	2,200	2	No
13	CWT Beds	1932	2,200	2	No
14	Research	1932	2,200	2	No
15	**Rehabilitation**	**1932**	**8,273**	**2**	**YES**
18	**Regional Counsel**	**1932**	**3,400**	**2**	**YES**
32	Gate House	1932	238	1	No
33	Engineering Shop	1932	1,000	1	No
T35	Paint Shop	1958	1,200	1	No
T35A	Supply Shop	1958	900	1	No
T38A	Ground Shop	1940	4,000	1	No
T38B	**Ground Supply Shop**	**1940**	**4,000**	**1**	**YES**
39	**Education**	**1978**	**9,533**	**1**	**YES**
T46	Education	1967	960	1	No
57	**Veterans Group**	**1932**	**672**	**2**	**YES**
58	EMS, Pest Control	1932	180	1	No
T59	Veterans Service Center	1978	2,762	1	No
60	Well Pump House	Unknown	Unknown	1	No
61	Booster Pump House	1932	180	1	No
X61	Pump House	Unknown	Unknown	1	No
62	Well Pump House	1958	290	1	No
X62	Booster Pump House	Unknown	Unknown	1	No
63	**Chlorinator House**	**1958**	**204**	**1**	**YES**
65	Booster Pump House	1958	130	1	No

1.2 ASBESTOS-CONTAINING MATERIAL INVENTORY

Altec performed a survey of suspect ACMs in the accessible areas within the referenced buildings which include sample collection, laboratory analysis and hazard assessment. The asbestos survey report contains the details and locations for the ACMs. A list of the ACMs identified in the surveyed areas is included in Appendix B.

1.3 ASBESTOS-CONTAINING MATERIAL DEFINITION

The term asbestos-containing material (ACM), as used in this O&M Plan, refers to all building materials that contain or could possibly contain asbestos fibers in its composition in quantities greater than 1% (as regulated by the USEPA). Determining if a material that is suspected of containing asbestos actually contains asbestos is done by collecting bulk samples from the material followed by laboratory analysis of the sample. If the material contains asbestos fibers in quantities greater than 1%, it is deemed ACM. Sometimes suspect materials are assumed to be ACM without sampling. These materials are referred to as presumed asbestos-containing materials (PACM). These confirmed or suspect asbestos-containing materials were identified and sampled by an EPA Accredited Asbestos Building Inspector/Management Planner. The collected samples are tested by the laboratories accredited through the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) in accordance with approved methods for polarized light microscopy (PLM), dispersion-staining techniques, and quantified as to type and percentage of each material present. The analysis identifies both asbestos and non-asbestiform materials. Suspect vinyl asbestos floor tiles may also be analyzed by the point count method or transmission electron microscopy (TEM) for further confirmation of positive or negative results.

Asbestos materials are classified into two major types: friable and non-friable. Friable asbestos exists in a form which may be reduced to powder when hand pressure is applied, thereby releasing asbestos fibers into the air (i.e., spray-applied acoustic or thermal system insulation which is asbestos-containing would be a friable form of asbestos). Non-friable asbestos materials have asbestos contained in a bonded matrix such that the matrix is not easily deteriorated nor asbestos easily released into the air except by a significant mechanical action (i.e., cutting, sanding, abrading, or drilling non-friable material). Friable asbestos-containing materials pose a higher risk for airborne exposure than non-friable asbestos-containing materials.

Asbestos NESHAP Requirement to Perform Point Counting on Friable ACM
The USEPA, National Emissions Standard for Asbestos (NESHAP) Standard, 40 CFR 61, Subpart M, regulates the disposal, manufacturing, fabricating, demolition, renovation, and spraying of ACM, which have an asbestos concentration of greater than one percent (1.0%), by area. In addition, NESHAPS requires friable ACM [also known as regulated

asbestos containing material (RACM)] be point counted, by polarized light microscopy (PLM), to quantify asbestos in materials estimated to contain less than ten percent (10%) asbestos.

EPA's memorandum dated May 8, 1991 clarified the point counting requirement. This memorandum applies to all RACM. The memorandum recommends the following procedures be followed for the analysis of RACM:

If after analyzing a sample by standard PLM, no asbestos is detected, point counting does not have to be performed. A minimum of three prepared slides should be analyzed and found to be negative for asbestos before making this determination. If the analyst visually estimates the amount of asbestos in a sample of potential RACM to be less than ten percent, the building owner, or operator, may choose to either, (1) assume that the material contains greater than one percent and treat the material as RACM, or (2) have the amount verified/ quantified by point counting. The final result that is obtained from point counting is the result that is to be reported.

If the amount of asbestos is observed in the sample, using PLM, but no fibers were counted during the point counting procedure, the results should be reported as "trace" asbestos. (This occurs when asbestos is seen on the slide, but no fibers fall under the graticule while point counting.)

EPA published a "Notice of Advisory" in the Federal Register on August 1, 1994, to "announce the availability of an improved bulk sample analysis test method". This procedure, "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116) was developed to enhance analysis of floor tiles and other non-friable material, improve precision, especially at lower concentrations, and "clearer instruction on the analysis of bulk materials, particularly where multiple layers are present". This method includes a provision for using calibrated visual estimation, using a set of standards containing known concentrations of asbestos, to calibrate the analyst, or for using point counting to quantify lower percentages of asbestos in samples. The calibrated visual estimation method trains the analyst to visually estimate percentages more accurately. EPA recommends using this method in place of the 1982 EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples". This newer method is appropriate, except when reporting asbestos concentrations (<10%) of potential RACM, where point counting must be utilized, as is explained in EPA's May 8, 1991, point counting memorandum.

An experienced analyst can detect asbestos in samples containing less than one percent if the asbestos fibers are of sufficient size to be resolved by the polarized light microscope. However, quantifying low concentrations is difficult. Visual estimates of asbestos concentrations tend to be higher than concentrations determined by point

counting. Proper homogenization of samples, and proper slide preparation are necessary to achieve representative results from point counting. Point counting is time consuming, and, therefore, more expensive, but the results are more accurate and precise than visual estimation.

Bulk Friable material, containing less than one percent asbestos, by area, and as determined by point counting, is not regulated under the Asbestos NESHAP rule. The Department of U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulates employee exposure to material containing greater than 1% as determined by procedures in 40 CFR Part 763, Appendix E, Subpart E. Clarification of OSHA's requirements must be obtained from the local office of OSHA.

The benefit of point counting is that it produces a systematic means of quantitative analysis. Point counting is dependent on the analyst's ability to correctly identify asbestos in a sample. Thorough examination of the entire sample (using a stereo microscope), obtaining a homogenous sample, and careful slide preparation will improve the analyst's ability to detect and quantify asbestos, either by visual estimation, or by point counting. The use of calibrated asbestos standards should improve an analyst's ability to visually estimate low percentages of asbestos, and, therefore, assist the analyst in concluding the need to perform point counting.

2.0 O&M PLAN DESCRIPTION

This document consists of a set of procedures that should be applied to building cleaning, maintenance, and general operations in order to maintain a building environment free from any asbestos contamination.

This document serves as the policy for all custodians, maintenance personnel and service/ renovation contractors who may encounter asbestos containing materials (ACM) while working in the covered buildings at the Raymond G. Murphy VA Medical Center. This document is called an Asbestos Operations and Maintenance (O&M) Plan. The Asbestos O&M Plan is designed to protect the health and safety of all persons working around asbestos and to comply with all regulations set forth by the Environmental Protection Agency (EPA) and the U.S. Department of Labor, Occupational Safety and Health Administration (Fed/OSHA). National Institute for Occupational Safety and Health (NIOSH) recommendations have also been incorporated into this document.

The Asbestos O&M Program refers to the collective effort made in managing asbestos in the facility. It includes the O&M Plan, the O&M Participants, the equipment and all of the associated documentation.

This O&M Plan document is divided into several sections with O&M forms included in Appendix A. The entire document represents the full O&M Plan.

Ensuring the safety and health of all employees in accordance with regulations and guidelines published by OSHA and EPA is the primary goal of this O&M. Every effort has been made to minimize the inconvenience of the procedures on normal work routines.

It should be noted that this O&M Plan document is not an asbestos removal specification. This document describes procedures to be followed for implementation of operations and maintenance activities that will or may impact asbestos-containing materials in the covered buildings at the facility. Although this plan describes general work practices to follow for performing work associated with all types of ACM, regardless of friability and quantity, a project-specific specification should be created and implemented for use on large scale asbestos abatement/removal jobs.

2.1 PLAN OBJECTIVES

The purpose of this effort is to establish an O&M Program for controlling exposure to asbestos in the covered buildings at the facility. The O&M Plan focuses on the activities of custodians, maintenance workers, and service contractors. The principal elements of this O&M Program involve requirements and responsibilities for identification of

asbestos through surveys, training and certification of workers, employee/occupant notifications, proper work procedures for activities that have the potential to disturb ACM, and proper disposal of asbestos wastes.

The O&M Program has three main goals or objectives:

OBJECTIVE #1 - Identification of areas where damage to ACM has occurred on an ongoing basis,

OBJECTIVE #2 - Clean up and repair of previously damaged ACM in a prioritized manner to remove asbestos fibers that may have been previously released, and

OBJECTIVE #3 - Minimizing future fiber release through the control of activities that might disturb ACM.

Program Objective #1 will be accomplished by performing regular inspections (by designated trained facility staff) of identified ACM. Program Objective #2 will be accomplished by completing prioritized response actions and through implementation of this O&M plan. Program Objective #3 (minimizing ACM disturbance) will be accomplished by adopting specially designed work practices for custodial and maintenance workers.

Success in achieving and maintaining a building free of asbestos contamination depends on the characteristics and location of the ACM and the enforcement of strict work procedures. O&M procedures will not be sufficient for ACM that is severely damaged or is located in certain building locations where environmental or physical factors may affect the material. These materials will need to be removed/repaired by trained asbestos abatement contractors.

2.2 LAYING THE GROUNDWORK FOR AN EFFECTIVE O&M PROGRAM

An effective Asbestos O&M Plan contains specific activities and procedures that are established to reduce or minimize exposure of building occupants and workers to asbestos. An Asbestos O&M Plan should be implemented after an asbestos survey has identified all asbestos-containing materials and evaluated their associated hazard potentials. An O&M Plan is not an alternative to asbestos abatement, but it is an essential part of the overall asbestos management program. The Asbestos O&M Plan can be designed either to reduce asbestos exposure while specifications for removal are being prepared or to ensure that asbestos-containing materials that are not removed are maintained in good condition.

The Asbestos O&M Plan for the covered buildings at the Raymond G. Murphy VA Medical Center has been developed in accordance with the building type and usage, the nature of the asbestos-containing material, and the ultimate goal of the asbestos management program.

A successful Asbestos O&M Program is well-organized and well managed. The responsibilities and activities of every participant (both in-house and outside services) must be specifically defined.

A successful Asbestos O&M Program requires a serious commitment from all levels of management. This commitment starts with an administrative organization and a plan. The key person is the Asbestos Program Manager. This person will be appointed by management. He/she is typically a health and safety officer, industrial hygienist, or similar in-house professional. The Asbestos Program Manager is responsible for directing maintenance personnel and outside contractors.

Demolition activities may ultimately expose ACMs that were previously unidentified or covered and were inaccessible during the previous survey(s). Outside contractors performing demolition activities should be informed of the potential presence of ACM and trained to identify suspect ACM in the covered buildings at the Raymond G. Murphy VA Medical Center. Destructive testing should be performed prior to allowing the demolition contractor to begin work.

One of the most important areas of concern, and major responsibilities of the Asbestos Program Manager and O&M Supervisor, is to supervise and govern contractors and renovation in the building.

All work performed by employees in the covered buildings involving the use, alteration, maintenance, renovation or demolition of asbestos or any standard activity which may contact asbestos materials or may produce airborne asbestos fibers must comply with asbestos control procedures.

Maintenance, facilities, engineering, and custodial personnel shall be informed of the presence and locations of asbestos-containing materials in the covered buildings at the Raymond G. Murphy VA Medical Center, the possible public health impact of the materials found and the appropriate preventive health measures that they should take (for instance, conducting routine visual inspections and conducting maintenance in a knowledgeable and controlled manner).

2.3 APPLICABLE REGULATIONS

Three primary asbestos regulations include:
AHERA/ASHARA (applies to Schools and public buildings)
NESHAPS (applies to air emissions and exposures to the general public)
OSHA (applies to employees exposure)

There are numerous other regulations, both on the federal, state, and local levels.

Each type of regulation serves a specific purpose:
29CFR 1910.1001 Federal OSHA, Covers Asbestos in the workplace
29CFR 1926.1101 Federal OSHA, Asbestos construction standard
40CFR 763 – also known as AHERA - Asbestos in Schools regulation
40CFR Part 61, M, National Emission Standard for Hazardous Air Pollutants (NESHAPS)
Inspection prior to Renovation or Demolition

2.4 AGENCY NOTIFICATION REQUIREMENTS

Work involving the disturbance or potential disturbance of ACM in the covered buildings at the Raymond G. Murphy VA Medical Center will be performed by O&M Maintenance Workers and Supervisors or by contracted private asbestos abatement contractors. Contractors retained by the Raymond G. Murphy VA Medical Center to complete asbestos-related projects must be appropriately licensed, carry and be able to demonstrate that they carry appropriate types and amounts of insurance and provide work crews with current certification training, respirator fit test and medical approval documents.

Working with asbestos also requires notification to certain regulatory agencies in certain circumastances.

2.4.1 NESHAPS Notifications

RULE 3050 ASBESTOS REMOVAL FEES
National Emission Standards for Hazardous Air Pollutants (NESHAPs), adopted by reference as District Rule 4002 sets forth that fees are applicable to all demolitions whether or not asbestos is present; and renovations in which 260 linear feet, 160 square feet, or 35 cubic feet or more of regulated asbestos containing materials are disturbed. Every person filing notification of an asbestos removal project, subject to the provisions of Rule 4002 (NESHAPS), shall pay upon filing, the nonrefundable fee.

RULE 4002 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

This rule incorporates the National Emission Standards for Hazardous Air Pollutants from Part 61, Chapter I, Subchapter C, Title 40, Code of Federal Regulations (CFR) and the National Emission Standards for Hazardous Air Pollutants for Source Categories from Part 63, Chapter I, Subchapter C, Title 40, Code of Federal Regulations (CFR). All sources of hazardous air pollution shall comply with the standards, criteria, and requirements set forth therein.

Annual notification is required if nonscheduled renovation operations conducted during the year are expected to exceed 100 square feet. This notification is due by December 17 of the year preceding the year in which notification is given.

Renovation notification is required if more than 260 linear feet, 160 square feet, or 35 cubic feet or more of regulated asbestos-containing materials are disturbed. The notification must be postmarked at least 10 working days prior to the start of work activities.

Demolition notification is always required, even if there is less than 100 square feet of asbestos that will be disturbed or no asbestos at all. The notification must be postmarked at least 10 working days prior to the start of demolition activities.

Notification must be typewritten on forms provided by SJVAPCD, available at their website. A filing fee must accompany the notification. Consult the SJVAPCD website for current fee schedules, which are amended frequently.

Notifications must be revised if the quantity of asbestos changes by 20% or more, the start date changes, or the complete date changes.

2.4.2 Federal EPA Notification

Federal EPA does not require notification if the SJVAPCD has been notified.

2.5 DEFINITIONS OF ASBESTOS RELATED TERMS

Acceptable Air Level is the recommended concentration in regards to airborne fibers following asbestos abatement or O&M work. It is usually reported in fibers/cc. A background level of < 0.01 fibers/cc (which is the recommended EPA and NIOSH Clearance Level) is commonly adopted as the Acceptable Air Level.

Adequately Wetted means sufficiently mixed, soaked or coated with water to prevent or contain the release of asbestos fibers into the air.

Amended Water means a water solution containing an effective low sudsing wetting agent.

Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophylite, and actinolite, in a fibrous form, and as determined by polarizing light microscopy (PLM).

Asbestos Abatement Contractor is a company that provide services for ACM abatement and for building decontamination following a fiber release episode.

Asbestos Consultant is a State of California Certified Asbestos Consultant (CAC), Certified Industrial Hygienist (CIH), Architect, and others, who may assist in various aspects of the program.

Asbestos-Containing Material (ACM) means any material which contains asbestos in one-tenth of one percent (0.1%) or more by weight by definition according to Cal/OSHA regulations, and/or greater than 1% in accordance with EPA or San Joaquin Valley APCD. ACBM and ACCM are ACM.

Asbestos-Containing Building Material (ACBM) means asbestos-containing building material.

Asbestos-Containing Construction Material (ACCM) means asbestos-containing construction material.

Asbestos Fiber is any fiber of chrysotile, amosite, crocidolite, tremolite, anthophylite, and actinolite longer than 5 micrometers and with a length to width aspect ratio of greater than 3 to 1 (meaning it is at least 3 times longer than it's width).

Asbestos Free is the designation of any material that has been tested and documented to contain less than one tenth of one percent (0.1%) asbestos by weight (Cal/OSHA) or 1% or less asbestos by weight (Fed). California's definition of an asbestos-containing material is 0.1% or greater. The Federal definition of asbestos-containing material is greater than 1% asbestos by weight.

Asbestos Danger Label means a label which contains the following wording, printed in letters of sufficient size and contrast to be readily visible and legible: DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD.

Asbestos Related Demolition Project means activities which include the removal of all or a portion of a structure which contains friable ACM or other ACM which may become friable when cut, crushed, ground, abraded, pulverized, or burned.

Asbestos Related Work means any activity involving asbestos-containing materials which has the potential to release asbestos fibers into the air. This includes the demolition, renovation or encapsulation of friable asbestos materials or any operation involving non-friable materials which could cause the release of asbestos fibers into the air. This also includes areas in which glove bag work is being performed and areas that are undergoing vinyl asbestos floor tile removal.

Asbestos Removal Project means activities which include the physical removal of friable ACM or non-friable ACM that can become friable from the surface of a structure or from equipment which is intended to remain in place after the removal.

Asbestos Waste Disposal Site means a solid waste disposal facility that is operated under a permit issued by the state and is authorized to receive asbestos containing solid wastes.

Asbestos Work Area means the area fully enclosed with polyethylene and made air tight immediately surrounding the asbestos work. Use of negative air filtration is essential in most of these operations. All activity of the asbestos removal occurs within the asbestos work area.

Buffer Zone means the area surrounding the asbestos work area which is demarked with tape barriers and adequately posted with asbestos work warning signs. The buffer zone provides an extra margin of safety for those passing near the asbestos work area.

Ceiling Limit or Concentration is the maximum allowable concentration to which a worker may be exposed for any 30 minute period referred to as a Short Term Exposure Level (STEL) or an Excursion Level (EL) expressed as 1.0 fiber/cc in 30 minutes.

Certified Industrial Hygienist (CIH) is an individual certified by the American Board of Industrial Hygiene (ABIH), and is recognized nationally and internationally as having comprehensive practice in all areas of industrial hygiene, including asbestos-related topics.

Containment Area means a negative pressure enclosure or asbestos project work area and decontamination facility configured so as to isolate asbestos project activities from areas which are to remain uncontaminated.

Decontamination Facility means that portion of the containment area containing an equipment room, shower facility and a clean change room.

Demolition means the wrecking, razing, or removal of any structure or load-supporting structural item of any structure, including any related material handling operations, and

includes the intentional burning of any structure. Demolition should not be confused with renovation.

Documentation means the complete record keeping associated with a comprehensive Asbestos O&M Plan. Each of the elements and all of the activities should be clearly chronicled and the associated records maintained for 30 years or longer. The location of asbestos, the results of any air monitoring, medical surveillance programs, respiratory protection, training, cleaning, repairing and removal are all important things to document.

Emergency Procedures include a description of who will be notified and what safety precautions will be instituted in the event of an accidental fiber release. A special team should clean up the debris and air samples should be taken during the activity.

Emergency Renovation means the unexpected and unplanned repair or replacement of major components, equipment or building materials which is required to avoid interruption in occupancy, utility service or to avoid significant damage to system reliability or system facilities.

Encapsulation means activities, which include the coating of ACM surface material with a penetrating or bridging type of sealing material for the intended purpose of preventing the continued release of asbestos fibers from the material into the air. This definition shall not include the repainting of a previously painted nonfriable ACM surface which is not damaged primarily for improving the appearance of such surface.

Enclosure means the construction of an airtight, impermeable permanent barrier around ACM to control the release of asbestos fibers into the air. It is also called a negative pressure enclosure.

Environmental Attorney is someone who provides advice on legal requirements and liability aspects of the asbestos or other environmental issues.

Environmental Protection Agency (EPA) is a Federal agency which regulates certain areas of asbestos laws. EPA Federal Region IV is located in San Francisco, California and regulates the State of California.

EPA Regional Asbestos Program Manager and State/Local Government Advisors provide general guidance and answer specific questions about asbestos.

Fibers/cc means the number of fibers per cubic centimeter of air. It is the unit of measure used to express the airborne concentration of asbestos fibers.

Friable asbestos-containing material (ACM) means any material containing more than one percent asbestos which has been applied on ceilings, walls, structural members, piping, duct work, or any other part of a building, which when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. The term includes non-friable asbestos-containing material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

Grade D Breathing Air means an air supply that contains 19.5 – 23.5% oxygen on a volumetric basis, not more than 10 volumes of carbon monoxide or 1,000 volumes of carbon dioxide per million volumes of air, not more than 5 milligrams of condensed hydrocarbons per cubic meter of air and no objectionable odors.

Health Effects refers to studies of humans exposed to asbestos in the workplace that have revealed findings confirming adverse health effects; increased cancer rates in certain worker, lung abnormalities in asbestos workers and their family members, and asbestosis, mesothelioma, and digestive cancers.

HEPA means High Efficiency Particulate Air and refers to a filter's capability to remove asbestos and other fibers as small as 0.3 micron size (mono dispersed particles) at an efficiency of 99.97%.

HEPA Vacuum means a vacuum which utilizes a High Efficiency Particulate Air filter capable of removing asbestos fibers in air that are 0.3 microns in size or greater.

HEPA Exhaust System means a HEPA exhaust/vacuum system set up to collect and filter air that may contain asbestos fibers from operations including asbestos removal and/or contamination clean-up.

Inspection means an activity undertaken in a school building, or a public and commercial building, to determine the presence or location, or to assess the condition of, friable or non-friable asbestos-containing material (ACM) or suspected ACM, whether by visual or physical examination, or by collecting samples of such material. This term includes reinspections of friable and non-friable known or assumed ACM which has been previously identified. The term does not include the following: inspections performed by employees or agents of Federal, State, or local government solely for the purpose of determining compliance with applicable statutes or regulations; or visual inspections of the type solely for the purpose of determining completion of response actions.

Inspector means an individual who is certified by EPA to identify and assess the condition of ACM. Inspectors shall perform their duties in accordance with the techniques, knowledge, training and responsibilities outlined in the regulations.

L means liters, in relation to volume of air.

Management Planner means an individual who is certified by EPA to assess the hazard of materials containing asbestos, to determine the appropriate response actions and to write management plans.

Major fiber release episode means any uncontrolled or unintentional disturbance of ACM, resulting in a visible emission, which involves the falling or dislodging of more than 3 square or linear feet of friable ACM.

Minor fiber release episode means any uncontrolled or unintentional disturbance of ACM, resulting in a visible emission, which involves the falling or dislodging of 3 or less square or linear feet of friable ACM.

MSHA is the Mine Safety and Health Administration

Negative exposure assessment is a set of personal air sampling results (collected on O&M or asbestos workers) that documents low airborne fiber exposures were obtained during similar work. It is used to establish the necessary worker protection until air sample results can be obtained for a particular project.

NESHAPS RACM is friable ACM and NESHAPS Category I or II ACM that have or may become friable (containing greater than 1% by PLM)

NESHAPS Category I Non-Friable is non-friable ACM such as floor tile/mastic, gaskets, roofing (containing greater than 1% by PLM)

NESHAPS Category II Non-Friable is non-friable ACM such as transite (containing greater than 1% by PLM)

NIOSH is the National Institute for Occupational Safety and Health

Non-friable Asbestos means asbestos material in a bonded matrix such that asbestos fibers are not released unless a significant mechanical action, such as sawing, cutting, drilling, sanding, etc. is applied. This includes Transite sheeting and piping, asbestos board, and undamaged Vinyl Asbestos Tile or Vinyl Floor Coverings including linoleums with a fiber backing.

Notification is the requirement of building owners to either let agencies or building occupants know that asbestos will be removed from a building, that a building will be demolished or, that asbestos is present in a building. Because building occupants can disturb non-abated asbestos materials, all occupants should be notified of the location of ACM and the need to avoid disturbing these materials. The notification statement should be as complete as possible in the disclosure, but should not create hysteria among the building occupants. A Certified Asbestos Consultant is often consulted when developing notification statements. Notification may be made by distributing written notices, posting signs, or by holding one or more information meetings/sessions.

OSHA means the Federal Occupational Safety and Health Administration

OSHA Class I job involves work with TSI, surfacing & presumed ACM

OSHA Class II job involves work with all other ACM

OSHA Class III job involves maintenance/repair work where ACM is disturbed to repair another component (removed ACM will fit in 60”X60” glove bag)

OSHA Class IV job involves maintenance & repair work to clean up debris from Class I, II or III jobs

OSHA Asbestos EL is 1 f/cc for a maximum of 30 minutes – the excursion limit

Phase Contrast Microscopy (PCM) is the visual analysis of air sample media performed at 450x magnification. Present NIOSH procedures and OSHA 7400 “A” Method use this type of microscopy which involves counting all types of fibers greater than 5.0 microns in length with a length to width ratio of at least 3 to 1, over a known surface area of the filter. Results are reported in fibers/cc.

PE is a Professional Engineer

Periodic Monitoring and Reassessment is a reference that asbestos O&M Plans require periodic air monitoring and/or other contamination checks plus routine assessment. This element of the Asbestos O&M Plan is designed to ensure and document that "non-hazardous" asbestos-containing materials stay "non-hazardous".

Periodic Surveillance is evaluation for the purpose of recording or reporting a change in the condition of known or assumed ACBM

Permissible Exposure Limit (PEL) is the OSHA limit (0.1 f/cc over an 8 hour time weighted average) to which employee exposure is to never exceed.

Polarized Light Microscopy (PLM) is the visual analysis of bulk sample material performed commonly 100x magnification. It is the current EPA and NVLAP recommended method for the determination of asbestos form mineral fibers in building materials (bulk samples). The analysis involves the use of dispersion staining liquids to match the known refractive index of asbestos form minerals.

Potentially Friable means any non-friable material which in its present and normal state would be considered hard, firm, encased or well bound, and not readily crumbled or pulverized; which will crumble or pulverize when subjected to strong abuse, hard contact or the drilling, cutting, sanding, breaking, etc. associated with construction or demolition activities.

Posting of Signs means that special warning signs containing information about asbestos shall be purchased and placed in locations where asbestos exists. The identification and marking of all ACM is required for all maintenance areas and will be explained in the labeling/marking section of this O&M document.

Project Designer means an individual who is certified by DOSH to formulate plans and write specifications for conducting asbestos projects.

Project Monitor means an individual who is certified by DOSH to observe abatement activities performed by contractors, to represent the building owner to ensure work is completed according to specifications and in compliance with statutes and regulations, and to perform air monitoring to determine final clearance.

Protective clothing means protective outer clothing, which is worn by an individual who is engaged in an asbestos project regardless of the concentration of asbestos fibers in the air within the asbestos project. Protective clothing consists of coveralls or similar whole body covering, head covers and foot covers.

Public and commercial building means the interior space of any building which is not a school building, except that the term does not include any residential apartment building of fewer than 10 units or detached single-family homes. The term includes, but is not limited to: industrial and office buildings, residential apartment buildings and condominiums of 10 or more dwelling units, government-owned buildings, colleges, museums, airports, hospitals, churches, preschools, stores, warehouses and factories. Interior space includes exterior hallways connecting buildings, porticos, and mechanical systems used to condition interior space.

Re-Inspection Procedures means the recommended procedures for conducting periodic re-inspection of the asbestos containing materials as required in the regulations.

Renovation means the removal or stripping of friable or non-friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, etc. in any building, facility, or installation. It is usually associated with a tenant improvement or change in existing facilities processes or space requirements.

Respirator means an appropriate breathing device that provides protection against fibers in air.

Response action means a method, including removal, encapsulation, enclosure, repair, and operation and maintenance, that protects human health and the environment from friable ACBM.

Scanning Electron Microscopy (SEM) is analysis of bulk or air sample material performed at magnification from 450x through 15,000x. This method utilizes energy dispersive microanalysis (X-ray) to identify asbestos only fibers. Method involves the counting of fibers, discriminating between less than and greater than 5.0 microns in length, in a known surface area of filter. None of the published regulations currently specify the use of SEM for asbestos analysis.

Small-scale, short-duration activities (SSSD) are tasks performed for to remove a limited amount of ACM over a limited time.

Special Decontamination Chamber (Decontamination Unit) is a special enclosure containing three chambers/rooms that is constructed of plastic sheeting covering a suitable wood/plastic frame which is installed immediately adjacent and connected to the asbestos work enclosure. The decontamination unit provides the only means of entering and exiting the asbestos work enclosure. The special chambers are considered to be dust tight and to contain any contamination carried out of the asbestos work enclosure by a worker.

Supervisor means an individual who is certified by DOSH to supervise and direct an asbestos project in accordance with the Asbestos Control Act and the rules and regulations adopted and promulgated pursuant to this act.

Training can mean sereval different things. An employee awareness training session is needed for custodial, maintenance and service employees to outline proper cleaning and maintenance procedures that should be employed around asbestos-containing materials. Training of all employees should be updated annually, or more frequently as needed. New employees should be trained before they begin work that might impact ACM. Employees receiving “awareness training” are not expected to be employees that

would respond to potential fiber release episodes. Additional training is required for asbestos O&M workers and supervisors.

Transmission Electron Microscopy (TEM) is analysis of bulk or air sample material performed at magnification from 1000x through 25,000x. It is the state-of-the-art analytical method for air samples. This method utilizes high magnification to identify, measure, and count asbestos fibers. The mass of each fiber may also be estimated if choice for analyzing asbestos based on its sensitivity to the smallest fibers and on its specificity for asbestos. Extremely thin asbestos fibers (typically 0.0025 micron in diameter) can be detected.

Time Weighted Average (TWA) the measured concentration of a particular substance weighted and averaged typically over a normal eight hour work day.

Type-C Respirator System means an airline respirator designed for atmospheres not immediately dangerous to life or health. It consists of a source of respirable breathing air, an air hose with a detachable coupling, flow control fittings and a facepiece, helmet or hood.

Warning Sign means a sign not less than eleven (11) inches wide which contains the equivalent of the following legend, printed in letters of sufficient size and contrast to be readily visible and legible: DANGER ASBESTOS CANCER AND LUNG DISEASE HAZARD AUTHORIZED PERSONNEL ONLY RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA.

Wet Cleaning means the process of using amended water or a removal encapsulant and a wet brush, mop, cloth, sponge or similar wet cleaning device to remove completely any visible ACM residue from surfaces. This definition does not include the use of a non-HEPA filter-equipped wet vacuum cleaner to pick up wet ACM debris or contaminated wastewater.

Wetting Agent means a surfactant or chemical that is added to water to decrease its surface tension and allow it to spread more easily over or penetrate into a surface that is covered with ACM.

Whole Body Coverall means a coverall type garment with head and foot coverings worn to prevent contamination of the employees regular work clothes and person.

Work Area means a specific room or physically isolated portion of a room in which ACM is required to be handled in accordance with the requirements of these regulations. These areas are designated as work areas from the time that the room, or portion of it, is being prepared in order to perform the asbestos project until the time the area has

been cleaned free of all visible residue in accordance with applicable Departmental regulations.

Worker means an individual who is certified by DOSH in a nonsupervisory capacity to clean, handle, repair, remove, encapsulate, haul, dispose of or otherwise work with ACM in activities involving more than three square feet or three linear feet of ACM.

Work Practices are an essential element of the asbestos O&M Plan and includes a set of written work practices for the custodial, maintenance, construction staff, or outside contractors performing construction services. These include procedures for using protective equipment, development of proper cleaning practices, design of adequate maintenance practices, establishment of renovation and remodeling practices, and planning for fiber release episodes.

3.0 EMPLOYEE TRAINING & RESPONSIBILITIES

Of the various ACMs in the covered buildings at the Raymond G. Murphy VA Medical Center, certain types have a greater potential for fiber release than others. In order to avoid exaggerated control measures on materials with low potential for fiber release or insufficient control measures for materials with a high potential for fiber release, the types of asbestos work have been developed for friable and non-friable ACM. Each class applies to a different work situation in which asbestos fibers may be released into the air through operations performed on or with the asbestos material. The dividing of work into these predetermined classes assures a program in which various jobs that may involve asbestos materials are performed in a manner that maintains the necessary protective requirements of the EPA and OSHA regulations while at the same time reducing the unnecessary control measures.

3.1 OSHA JOB CLASSIFICATIONS

OSHA describes several classes of asbestos work. The standards for the construction industry classify the hazards of asbestos work activities and prescribe particular requirements for each classification:

Class I is the most potentially hazardous class of asbestos jobs and involves the removal of thermal system insulation and sprayed-on or troweled-on surfacing asbestos-containing materials or presumed asbestos-containing materials. **(Class I – TSI, Surfacing and PACM)**

Class II includes the removal of other types of asbestos-containing materials that are not thermal system insulation, such as resilient flooring and roofing materials containing asbestos. **(Class II – All Other ACMs)**

Class III focuses on repair and maintenance operations where asbestos-containing or presumed asbestos-containing materials are disturbed. **(Class III – O&M Work)**

Class IV pertains to custodial activities where employees clean up asbestos-containing waste and debris. **(Class IV – Custodial Activities)**

People who are involved in dealing with building materials that contain asbestos must be trained according to requirements found in the Asbestos Hazard Emergency Response Act (AHERA) as well as other state and federal regulations.

3.2 TRAINING COURSES

OSHA Class I & OSHA Class II Jobs
These jobs are performed by OSHA Certified Asbestos Worker, Asbestos Contractor/ Supervisor, and Certified Asbestos Consultants only.

OSHA Class III Jobs
Persons performing these jobs require OSHA O&M Training which is a 16-hour course established for O&M Supervisors and building maintenance personnel who supervise and/or perform responses to small spills or perform small-scale repair activities on building systems with ACM. This 16 hour asbestos training course includes how to identify suspect asbestos-containing materials, respond to asbestos emergencies, recognize asbestos hazards, and prevent exposure to themselves and building occupants. It also includes personnel air monitoring procedures, fit-testing protocols, setting up mini-enclosures and regulated areas, and personal decontamination procedures. It includes hands-on training in spot removal of fireproofing and acoustic ceiling materials, as well as glove-bag removal of pipe insulation. Maintenance Workers should complete the Class III OSHA O&M Training course in English or Spanish, whichever language the individual is most proficient in. Yearly retraining is required.

OSHA Class IV Jobs
Persons performing OSHA Class IV jobs require AHERA Awareness Training, a 2 hour course that meets EPA training requirements under AHERA for custodial/janitorial, construction and other maintenance personnel who work in buildings and schools and who may come into contact with ACM. This is the basic training for persons who may contact, but not disturb, asbestos containing materials, or who may clean up existing contamination. Class IV course work teaches how to safely clean up asbestos spills, repair damaged ACMs and perform contractor work in areas with friable ACMs. It also includes training in the proper use of respirators, protective clothing, HEPA vacuums and repair procedures. Yearly retraining is required.

3.3 O&M PROGRAM PARTICIPANTS

In order for an Asbestos O&M plan to be effective it must be properly implemented and followed by all involved personnel. Therefore, the VACCHS employees who encounter asbestos or whose subcontractors encounter asbestos are charged with specific responsibilities for implementing and following these procedures.

It is recommended that the Asbestos Program Manager be a person with years of experience at the VACCHS Building 1, a good understanding of its renovation history, and someone who understands asbestos and the aspects of O&M plans, asbestos

management and asbestos abatement. It is recommended that the O&M Supervisor be a person with years of experience at the VACCHS Building 1, detailed experience with building operations and an understanding of the affected systems, and someone who understands asbestos, good asbestos maintenance/monitoring practices and the aspects of asbestos removal/abatement.

The APM and the O&M Supervisor will act as sources of information for the O&M program.

It is important the all levels of employees working in the building be aware of the locations and extent of the ACM in the building.

It is the facility management's responsibility to (1) emphasize the need for recognition and identification of asbestos materials and (2) to implement proper asbestos handling procedures. In addition to this identification system for asbestos maintenance, the management shall designate individual(s) as necessary to oversee and coordinate maintenance of written records of asbestos materials, as jobs are completed and materials identified, in an orderly manner so that future reference can be made if needed.

It is facility management's responsibility to insure that continued re-inspections are conducted and documentation is maintained describing the results of the re-inspections.

The facility management shall provide staff, custodial and maintenance workers access to a copy of this O&M Plan. Facility management shall required training for custodial and maintenance workers who will encounter asbestos in their work. Facility management shall establish a documentation process and maintain paperwork as a permanent record of the Asbestos O&M Program. Paperwork shall include this O&M Plan as well as all past and future asbestos-related paperwork. Facility management shall consult with certified asbestos/industrial hygiene professionals and/or state, local and federal regulatory agency representatives to update the asbestos O&M program to maintain compliance with changing regulations. Facility management shall maintain medical exam and training records for all employees engaged in custodial and maintenance activities involving ACM.

3.3.1 Asbestos Program Manager (APM)

The Asbestos Program Manager (APM) has an overall responsibility for the asbestos O&M Program. He/she coordinates all activities related to the Asbestos O&M Program. He/she may assign work tasks such as recordkeeping and communications to other personnel as required or allowed by facility management. Ideally, the APM should complete training for OSHA Class I and Class II jobs since he/she will be in charge of all

asbestos work at the facility. The course work includes the initial 5 day Contractor/Supervisor, 3 day Building Inspector, 2 day Management Planner and the 3 day Project Designer. Yearly retraining is required to maintain accreditation and should be maintained for each course (Contractor/Supervisor, Inspector/Management Planner and Project Designer). A minimum of three days of continuing education will be required per year.

The APM will monitor and manage the ACMs in the covered buildings at the facility. The APM should thoroughly understand the scope of work of all remodeling or repair work involving ACM. He/she will determine the procedures required for the work. Once the scope of work has been determined, the specific procedures outlined in the O&M Plan must be used. This O&M Plan outlines the different types/classes of jobs and the associated procedures that are required for each. The APM will need to make occasional judgment calls on modifying work procedures to fit special cases. The general rule is to minimize or eliminate the possibility of anyone's exposure to asbestos fibers, but to protect them for the possibility of exposure should one occur.

The APM is responsible for the implementation of the O&M Plan. Duties include the following:

Establish work practices and procedures,
Ensure employees are properly trained,
Ensure proper equipment and material are available to carry out job assignments,
Approve work orders for all abatement work,
Fills out required reports,
Prepare all necessary paper work for the permanent asbestos file,
Ensure necessary decontamination facilities are used,
Ensure appropriate sampling is performed,
Determine appropriate response actions,
Control and monitor all building activities involving ACM, and
Periodically review the O&M Plan for effectiveness (at least annually) and make changes as necessary.

The APM may delegate some duties to the O&M Supervisor, but he/she retains responsibility for administration of the program.

After defining the scope of work for remodeling, the APM must determine whether minor or major abatement practices need to be employed. Larger renovation/construction projects must be performed under the guidelines provided for major asbestos removal. Major asbestos removal projects will require an abatement specification. For major removal projects the APM should get several competitive

asbestos abatement contractor bids. He/she should select the asbestos abatement contractor that appears to be best suited for the project.

3.3.2 O&M Supervisor

This person is responsible for supervising and assisting the custodial and maintenance workers while they are performing routine maintenance work that may or may not involve ACMs. The O&M Supervisor(s) should complete the Class III OSHA O&M 16 hour course.

Additional training could include a two-day, or equivalent, course in confined space entry; and Cardiopulmonary resuscitation (CPR) and first aid training, with annual re-training.

The O&M Supervisor in charge of a maintenance project/job shall insure asbestos materials are recognized and identified.

In order to ensure the safety and health of maintenance employees, the O&M Supervisor in charge of a maintenance project/job must understand the potential health effects of airborne asbestos fibers, the required work practices to eliminate/minimize the release of asbestos fibers, the required use (and proper fitting techniques) of personal protective equipment by all employees engaged in work involving asbestos and the practical use of common sense in controlling the release of asbestos fibers.

The O&M Supervisor is also responsible for maintaining a written record of the maintenance projects/jobs which involve asbestos and those employees which are assigned to perform those activities that involve asbestos-containing materials.

The O&M Supervisor shall also be responsible for periodic visual inspections to evaluate the structural integrity and condition of asbestos-containing materials, use of asbestos maintenance, project and other documentation forms, and maintenance of all laboratory results involving employee exposure while performing asbestos-related maintenance duties.

3.3.3 O&M Workers

Private contractor employees such as electricians, air conditioning mechanics, plumbers, steam and chilled water plant operators, etc. who will be required to handle ACM in the course of their otherwise non-ACM facility work will require training/accreditation as Asbestos Workers.

Facility O&M Workers are responsible for performing routine maintenance work that may or may not involve ACMs. These workers may disturb small amounts of ACM as part of routine maintenance activities. O&M Workers should complete the Class III OSHA O&M 16 hour course. VACCHS O&M Workers are responsible for performing O&M procedures in accordance with this O&M Plan and all other applicable rules and regulations, using the protective equipment supplied to them in accordance with their instructions and training, and reporting any activities not performed in accordance with the O&M protocol, established rules and regulations.

Prior to any O&M Worker performing a work assignment that may impact asbestos-containing materials, the O&M supervisor shall advise the O&M Worker about the presence of asbestos in his/her work area and remind him/her of the potential dangers associated with the release of asbestos fibers. When the job assignment involves materials that are not designated asbestos free, the use of asbestos-specific personal protective equipment (PPE) is required. In addition to the PPE, the work must be performed using the proper job class control measures.

Any O&M Worker who shall become engaged in asbestos work must complete a formal training program that meets regulatory guidelines for maintenance work, must undergo respirator training and fit testing, and must have a medical examination within 30 days of starting work.

Medical surveillance is the part of an O&M Plan which requires that all O&M Workers (who work with asbestos) receive a specialized physical examination to assure that they are physically fit to wear a respirator. OSHA regulations require an employer to make available to each of his employees a comprehensive medical examination within 30 days of his first employment in any occupation where he/she might be exposed to asbestos, and thereafter, at least annually. The employer shall also make available the same type examination within 30 days before or after the termination of employment, unless the employee has been examined within the previous one year period.

3.3.4 Custodians and Housekeeping Staff

Facility custodians are responsible for performing facility cleaning work on materials that may or may not contain asbestos. Facility custodians should attend the Class IV OSHA - AHERA Awareness 2 hour training course. This is the basic training for persons who may contact, but not disturb, asbestos containing materials, or who may clean up existing contamination.

4.0 O&M PLAN COMPONENTS

4.1 PROCEDURES

All facility employees and contractors whose duties involve work with and around ACM in the covered buildings must be alert to its existence and aware of its hazards. With this information, they will know what work can or cannot be done with regard to asbestos and protection against its exposure. All work schedules must be reviewed by the APM. All work done in the proximity of asbestos-containing materials will be done after hours when the fan units have shut off for the evening, whenever possible.

4.2 SCHEDULED O&M INSPECTIONS

The covered buildings should be routinely inspected for changes to the condition of identified ACM year round. ACMs shall be visually checked by trained personnel at least once every 3 months to identify and correct conditions that may exist in the buildings due to water damaged areas and other deterioration that may cause fiber release. The results of this inspection shall be recorded on the reinspection form in Appendix A. Maintenance personnel and building occupants shall be instructed to report promptly to the management the presence of any damaged ACMs. An appropriate assessment and repairs should be made as soon as possible.

A full scale re-inspection should be performed on an annual basis. Ambient air sampling for asbestos fibers, if adopted by the facility, should be included at the time of the annual inspection. Air sampling can provide informative data regarding the presence of asbestos fibers in the covered buildings.

4.3 O&M WORK RECORDS/INSPECTION FORMS

All changes to the covered buildings must be recorded. Contractors and maintenance personnel must register their names, dates and times and the purpose of the project with the APM. Contractor work forms are provided in Appendix A

One purpose of the Asbestos O&M Program is to prevent the disturbance of ACM except under controlled conditions. By implementing a system of in-house project notification and maintaining a project registry, a central control location will be established for dispersing important information, maintaining control over projects that will/could impact asbestos.

Thorough record keeping practices must be maintained in order to control potential asbestos related problems.

The following forms can be used to document O&M activities in the covered buildings. The APM is encouraged to modify these provided forms and/or create new forms that will be useful for ACM management as necessary to meet the specific needs of the building and staff.

Form OM-10 DESIGNATION OF CONTROLLED AREAS AND MATERIALS
This form can be used to identify areas that contain asbestos and should not be entered or used by non-trained personnel until further notice.

Form OM-20 NOTIFICATION OF AWARENESS TRAINING SESSION
This form can be used to notify personnel of planned asbestos awareness training sessions.

Form OM-30 AWARENESS TRAINING SESSION RECORD
This form can be used to document which personnel have attended asbestos awareness training sessions.

Form OM-40 CONSTRUCTION / MAINTENANCE EMPLOYEE NOTIFICATION
This form can be used to notify construction and maintenance personnel of the presence of ACM in the building and document that those personnel have received O&M related instruction/training.

Form OM-50 ASBESTOS-CONTAINING MATERIALS LOCATION NOTIFICATION
This is a multiple page form that can be used to inform building personnel that asbestos is present in the building and, in general, what ACMs are present and where they are located. This form will identify that ACM is a controlled material which should be handled using specialized work practices conducted by trained personnel, and that trained personnel will perform periodic surveillance of ACMs and will maintaining them in good condition.

Form OM-60 ASBESTOS WORK PERMIT REQUEST FORM
This form can be used by the O&M personnel when a project needs to be performed that may impact ACMs.

Form OM-70 MAINTENANCE CONTRACTOR NOTIFICATION
This form can be used to notify maintenance contractors of the presence of ACMs in the building and to document that these employees have been trained regarding the use of the ASBESTOS WORK PERMIT REQUEST FORM before performing maintenance work.

Form OM-80 EMPLOYEE NOTIFICATION OF AN ASBESTOS ABATEMENT PROJECT
This form can be used to notify and document that notification has been made to building personnel of planned asbestos abatement projects.

Form OM-90 RESPIRATORY PROTECTION TRAINING RECORD
This form can be used to document that specific O&M personnel have received training regarding the respiratory protection program.

Form OM-100 QUALITATIVE FIT TEST RECORD
This form can be used to document that specific O&M personnel have received a qualitative respirator fit test pursuant to the respiratory protection program.

Form OM-110 ASBESTOS OPERATIONS AND MAINTENANCE PROJECT
This form can be used to document specific information regarding planned O&M projects.

Form OM-120 O&M EMERGENCY EPISODE REPORT
This form can be used to document emergency episodes involving damage to ACMs and the potential release of asbestos fibers. Information entered on the form will include a description of the response measures taken to cleanup the spill and decontamination/clearance results.

Form OM-130 O&M QUARTERLY INSPECTION FORM
This form can be used to document the performance and results of quarterly building inspections.

4.3.1 Quarterly Inspections

Quarterly inspections should be performed and records maintained on all exposed ACMs. Exposed ACM is defined as any material visible to the inspector without his having to remove or disassemble barriers. Quarterly inspection forms consist of the following factors taken from the survey and exposure algorithm.

Factor (1), material condition, should be rated on the amount of deterioration with a scale rating from 0, no damage, to 5, widespread damage.

Factor (2), water damage, should also be rated on the amount of deterioration with a scale rating from 0, no damage, to 5, widespread damage.

Factor (3), exposed surface area, should be rated on a scale of 0, for no exposure, to 4 for 100% exposure.

Factor (4), accessibility of the material, should be between 1 for low, 4 for high. Inaccessibility is rated 0.

Factor (5), activity movement, should be rated on a scale of 0, for none, to 2 for high activity.

Factor (6), air plenum, direct air stream, should be rated on a scale of 0 to 6, high air flow will be factored as a 6, no direct air flow is rated as 0.

These inspection forms should have the last rating previously recorded enclosed so that there can be a progressive analysis. These forms, when complete shall then be used to update the exposure index. The exposure index is a rating used to quantify condition and potential disruption. The sum of factors 1 through 6 is multiplied by the index multiplier (Factors 7 x 8) as determined by the original survey. The resulting number is your exposure index. Interpretation of the exposure index may be seen in the comments section of the attached survey and exposure algorithm sheets.

4.3.1 Inspection Tips

In looking for new damage, notice any white residue on the tops of floors and on the tops of furniture. This will be an indication of damage. Look for exposed pipe insulation, any place where the wrap has been torn. Look at ceiling material to see if chunks of it have come loose.

Also note any situation where furniture may have been moved up to any asbestos-containing material in such a way as to possibly damage or loosen the material.

If any damage whatsoever is found, it must be reported on the inspection form. Also note the condition of HVAC filters in fan rooms. It is essential that these be changed on a regular schedule.

4.4 DESIGN AND USE OF PROJECT LOGBOOKS

An O&M logbook should be established for all work involving ACMs in the building, regardless of whether the work is performed by facility staff or by outside private contractors. The logbook serves as a record for maintaining all the records associated with each project. At a minimum the logbook should include copies of the employee's names, medical examination records, respirator fit tests, copies of any accident and injury reports, air sampling results, notes concerning any deviation from the standard

working procedures, daily sign-in and -out sheets for that project, waste disposal records, and any other pertinent documents, permits, notifications, photographs, or records.

The project logbook serves many important functions. It provides a ready reference for each project which may be produced at any time during the project or long after its completion. The logbook can be an important tool for planning and for estimation costs. When planning a project of a similar nature, it can aid in estimating how long a project will take to complete, how many people will be necessary, and how to attack specific problems.

A project logbook may help protect the facility in future litigation regarding particular buildings/projects. It can demonstrate that the workers/contractors performing the work attempted to do the best job possible using state-of-the-art techniques. The sign-in and sign-out sheets are a record of who entered the work area, for what purpose, and for how long. This information coupled with the air monitoring data can be used to estimate how much asbestos the person was exposed to and for how long. Copies of the daily inspection reports will also reveal if employees were wearing their respirators and that they were adequate to protect the workers at the levels of fibers documented by air sampling. This information will be valuable if needed for litigation in the future. It is important to note here that all the records must be kept, not just some of them. A permanently bound log book will be used to verify daily work schedules, lab results, and problem solutions.

The logbook should be well organized. There are two common methods of organization. The day-by-day method involves notations made for each work day. Entries must be made for days on which no work is done as well. Indicate that no work was done on this day and how the integrity of the jobsite was maintained.

Another common method of organizing a logbook is by activity. Using the by activity method, a loose leaf notebook is divided into each activity and all documentation, notes, and receipts concerning that activity are maintained in the appropriate section. The following outline is one suggestion for outlining a logbook. It should be noted that this is just one outline, depending on the requirements of each project some sections may not apply while additional ones may be necessary.

Pre-work Papers-EPA and State Notification forms, necessary state licenses, county or city permits (contractor's license, disposal permits, etc.). Records regarding the bonding company, size of bond, etc.

Contract Specifications - In this section would be a copy of the contract specifications including any attached drawings.

Personnel - Personnel including employment application, W-4 withholding forms, medical records, and any other records relating to each employee. Some companies also have each employee sign certificates stating that have read and understand the Operation and Maintenance Plan Training Information, been trained in asbestos removal techniques, trained and fit-tested for respirators, etc.

Sign-in Sheets - A separate section containing the daily sign-in sheets indication when each employee went in and out of the work area, their affiliation, and purpose of entering the work area. Included in this section would be a list of all authorized personnel permitted to enter the contaminated area. Also in this section is a record of each employee's work hours for payroll purposes.

Subcontractors - This section would be a record of all subcontractors' activities including copies of the contract, names, dates, etc.

Air Monitoring - All air sampling results for the project should be included in this section. Area air sampling and personal sampling results should be presented. Also included in this section must be a copy of the sampling and information concerning the work.

Waste Disposal - Records of waste disposal, including trip tickets, should be kept in this section.

Daily Inspection Reports - Copies of the daily inspection reports should be maintained. Reports should also indicate who performed the inspection, date and time of inspection. It is extremely important to include comments on unusual aspects of project and to address any problems that arose and how they were handled.

Other Sections - Other sections may be added as necessary to include injury/illness reports, receipts for rental equipment or lodging, reports from outside inspection or government agencies, newspaper clipping, etc.

The responsibility of maintaining the logbook is to be assigned to the APM. The logbook is prepared at the request of general counsel for the purpose of rendering legal advice and is subject to the attorney work product privilege. All logbooks are to be kept secure and confidential.

4.5 OSHA RECORDS AND REQUIREMENTS

OSHA requires that a poster be permanently posted on the job site notifying workers of their rights under the act. This poster, commonly known as the "Job Safety and Health Poster," is available from OSHA offices.

The APM should be familiar and have a working knowledge of OSHA requirements. All training should be based on the material outlined in this text, being sure to cover unduplicated material from GISO 5208. The most stringent guidelines of either source must be followed. When an employer has 10 or more employees, he is required to maintain a record of injuries and illnesses that occur. Part of this Worker's Compensation insurance carriers. The other requirement is maintenance of the "Log and Summary of Occupational Illnesses and Injuries -- OSHA Log 200". These forms and a booklet titled, "What Every Employer Needs to Know About OSHA Recordkeeping," are available from OSHA and provide information on injury and illness record keeping requirements.

4.6 MEDICAL RECORDS

All individuals involved in any asbestos work shall have a complete medical examination on file. The pulmonary function test is important to determine the person's ability to function with a respirator. Medical examinations are required at the beginning of employment or implementation of the O&M Program, on an annual basis, and at the end of employment. The medical exam is performed to evaluate employee's current health status and their ability to perform the necessary work using a respirator and to identify those employees with pre-existing medical conditions that could impact their ability to perform asbestos-related O&M work. Workers identified with conditions where it is not medically safe to wear a respirator should participate in any work involving asbestos.

4.7 SAMPLING RECORDS

All sampling records will be compiled by the APM or, if designated, by the O&M Supervisor.

4.7.1 Bulk Sampling

The APM will keep all sample results on file. This file should be updated as new information is obtained. Where bulk samples have not been previously collected, the APM shall ensure that samples will be collected of materials that will be disturbed during any renovation, demolition or maintenance activity, or will assume that the impacted materials are ACM. Bulk samples will be collected by those persons holding a current EPA accreditation. A copy of laboratory reports for bulk sample related to O&M activities will be retained by the APM.

4.7.2 Air Sampling

Air sampling must be performed during all Class I, II and III work activities. Class IV work does specifically not require air sampling. Two types of air samples are typically collected in regards to asbestos. The first type is "area" air samples from stationary locations using high volume air pumps. The second type is "personnel" air samples collected from worker's breathing zones for determination of compliance with the Permissible Exposure Limits. Air samples should be collected by the O&M Supervisor, the APM or other trained/qualified designee. Analysis of the collected air samples should be performed by a person trained and accredited in the NIOSH 582 coursework and analyzed in accordance with Phase Contrast Microscopy (PCM) by the NIOSH 7400 method in order to calculate the ambient fiber count or the employees Time Weighted Average (TWA). PCM can be performed in the field by trained persons using a specialized field light microscope or by a stationary laboratory.

All air sampling performed on O&M activities should be consistent the guidelines established in this O&M Plan and within regulatory guidance documents.

The following levels (based on phase contrast microscopy-PCM- analysis) will be used for setting corrective actions for ambient air sampling.

0.01 f/cc (or less) – acceptable ambient airborne fiber count levels and recommended air clearance level for O&M and asbestos abatement projects

Project-related "area" air sampling will include, at a minimum:
(1) one "area" air sample inside the work area; (2) one "area" air sample from the loadout area, if applicable; (3) one "area" air sample directly outside and adjacent to the work area; (4) one "area" air sample per shift from the exhaust of the negative air machine, if applicable; (5) one "area" air sample immediately outside the clean room of the decontamination system, if applicable.

Clearance "area" air sampling will include, at a minimum:
(1) one clearance sample for every 1,500 square feet, or one clearance sample for every 15,000 cubic feet, whichever is greater, and (2) a minimum of one sample per room or discrete area.

Routine "area" air sampling for glovebag activities should include, at a minimum,
(1) one sample inside general work area, and (2) at least one clearance sample. Clearance sample(s) will not be required if the personal and inside work area sample do not exceed a measured value of 0.01 fibers/cc with a detection limit below 0.01 fibers/cc.

Requirements for clearance sample for all Class III O&M projects are as follows. (1) Clearance sample will be performed in accordance with current regulatory requirements; (2) clearance sample(s) will be collected at a flow rate of no more than 10 liters per minute for 25-millimeter cassettes and will have a total volume of at least 1,200 liters of air; and (3) an area will be considered clear if the upper confidence limit of the airborne fiber concentration is less than 0.01 fibers/cc or less than background levels, as determined prior to abatement, whichever is greater.

All persons performing air monitoring for O&M projects will have completed training for the NIOSH Course Number 582 entitled *Sampling and Analysis of Airborne Asbestos Dust*, the *Asbestos Air Monitoring Course*.

Personnel performing air monitoring for O&M projects will not enter any demarcated work area without current EPA accreditation. All personal air samples will be reported with the type of respirator being used by the employees. Air sampling should include the submission of “blanks” (unused cassettes) with each day's samples. Blanks are usually analyzed if the collected air samples appear overly contaminated and can be a way to determine if the cassettes were contaminated before the air samples were collected.

In addition to project specific air monitoring, this O&M Plan should include performance of periodic “ambient” air sampling inside the building to assess the overall indoor air quality in reference to airborne (asbestos and non-asbestos) fibers. Ambient air monitoring is performed at stationary locations. In comparison with personnel air monitoring, higher volumes of air are collected at higher flow rates for ambient samples and a/c (plug-in) pumps are usually used. The results of periodic ambient air monitoring can be used to document the air quality in the building with regards to airborne fibers. When ambient air monitoring results are below 0.01 f/cc no corrective action is needed. When results of periodic air monitoring exceed 0.01 f/cc procedures will be initiated to (1) determine the fiber release origin and to (2) perform control procedures to stop the release.

Copies of the laboratory/analysis reports for all air samples taken as a part of an O&M project will be sent to the APM and maintained in the logbook.

4.7.3 Personal Air Monitoring

All personnel performing O&M activities will be monitored during performance of the O&M work using personal air sampling techniques. Sampling also should be performed during work area preparation activities if damaged ACM is present in the area.

Personal air monitoring is a method used to determine an employee's exposure to airborne asbestos fibers. Personnel air sampling involves setting a battery operated pump, suction hose and plastic cassette with a special filter on an employee within his/her breathing zone while he/she performs work. A special vacuum pump is used to pull air through the hose and filter in order to process a certain volume of air through the filter. Fibers suspended in the air near the breathing zone of the worker get pulled in and trapped in the filter. The filter or “sample” is viewed or “analyzed” with a specialized light microscope and fibers on the filter are counted using special procedures/methods established by the EPA. The volume of air that passes through the filter is calculated by measuring the flow rate of the pump (using a calibration device) and multiplying that by the number of minutes that the pump pulled air through the filter.

OSHA requires that employers determine their employee's exposure to asbestos, regardless of the type of respirator worn by the employee. Personal air monitoring results are used to help verify which type of respirator (half-face negative pressure, full-face powered air purifying, supplied air, etc.) provides adequate protection on a particular project and, therefore, should be worn by the employee. The higher the concentration of asbestos fibers, the greater the degree of protection needed.

4.7.4 Asbestos Permissible Exposure Limit

A Permissible Exposure Limit (PEL) is the maximum amount or concentration of a chemical that a worker may be exposed to under OSHA regulations. PEL's can be defined in two different ways :

Ceiling values are levels which, at no time, should be exceeded. They are sometimes denoted with the letter C in OSHA PEL tables.

8-hour Time Weighted Average (TWA) is an average value of exposure over the course of an 8 hour work shift. TWA levels are usually lower than ceiling values. Thus, a worker may be exposed to a level higher than the TWA for part of the day (but still lower than the ceiling value) as long as he is exposed to levels below the TWA for the rest of the day.

The PEL for employee exposures to asbestos fibers is 0.1 f/cc over an 8 hour work shift. The Short Term Exposure Limit - STEL (like a ceiling limit) for asbestos is 1 f/cc averaged over a 30 minute period. At no time should any one employee be exposed above the STEL in any 30 minute period during the work day.

4.8 DISPOSAL RECORDS

All waste generated from O&M projects will be properly stored and inventoried. Records must be kept regarding the disposal of asbestos waste. The APM must be able to prove, through waste manifests, disposal receipts, or other written records, that the asbestos removed from the buildings has been received and accounted for at an authorized disposal facility.

Small amounts of asbestos waste may be stored until such time that a sufficient amount has accumulated to warrant disposal. At no time should the waste accumulation exceed 90 days. Once one drop of waste is placed in the asbestos container the facility has 90 day to have that material transported for disposal.

A licensed asbestos transporter shall be contracted to transport ACM off site for disposal. The APM shall ensure that the disposal contractor is provided with the bulk sample reports and material safety data sheets (MSDS) for all chemicals, if any, used in the removal of the asbestos, if such material may be present along with the ACM waste.

Waste receipts provided for disposal must be forwarded to the APM so that a report may be sent to the state authorities within 30 days.

5.0 SPECIALIZED TOOLS & EQUIPMENT

Working with and around asbestos requires the use of specialized equipment and supplies. These include but are not limited to:

HEPA filtered vacuums
HEPA filtered negative pressure filtration machines (usually used by contractors)
Amended water/surfactant
6 mil (bag thickness) properly labeled polyethylene (plastic) disposable bags
6 mil polyethylene sheeting
Cutting & scraping tools
Disposable towels/rags
Duct tape
Retractable knifes/box cutters
Spray Adhesive
Spray bottles/misters – airless sprayers
Encapsulants
Protective disposable one-piece Tyvek™-style suits/coveralls
Special NIOSH-approved respirators
Gloves, boots, hard hats
Disposable mops, scrubbers, wire brushes

Proper use of the above protective equipment should be covered by the training sessions that each employee will attend. Other equipment found to aid in clean-up may be used with the provision that all tools be used properly, safely, and are cleaned upon completion of any work.

Equipment/supplies required for major abatement activities are provided by the project abatement contractor and are not described specifically herein.

5.1 HEPA VACUUMS

HEPA vacuums will be used on all O&M work. Only personnel trained on and familiar with HEPA vacuums will use HEPA equipment. Because HEPA vacuums trap asbesos fibers inside their canisters and filters, it is very important to store the vacuum in a secured isolated area and with specialized procedures. HEPA vacuums will be stored with duct tape placed over the tank inlet to prevent fiber leakage during non-use times. Vacuum hoses will be duct taped at each end in the same manner. Attachments will be kept clean and stored in a properly labeled and sealed 6-mil plastic bag between use. HEPA vacuums will be stored in a secured limited access storage room between uses.

They should be wet wiped prior to removal from a work area to ensure that no asbestos fibers remain on the outside of the unit.

Manufacturer instructions will be followed for all maintenance performed on HEPA vacuums. HEPA filters should be changed periodically, depending on the volume of usage. Records will be maintained for all services performed and filter replacement.

HEPA vacuums will be opened and cleaned out as often as necessary utilizing the following methods. Workers will wear protective clothing and, as a minimum, fullface air purifying respirators. Bags and filters will be removed in an established work area or other containment as authorized by the APM. After being misted thoroughly with water, the vacuum bags and filters will be carefully removed from the unit, and replaced with new bags/filters. The vacuum will be labeled with appropriate asbestos warning labels.

5.2 NEGATIVE PRESSURE FILTRATION DEVICES

These devices will typically be used on abatement jobs that are conducted by an abatement contractor. These devices have several different names; such as negative air machine, NPFD, NFD, air hog, etc. On asbestos abatement projects these units are equipped with HEPA filters and, when installed properly, they create negative pressure in an enclosed area by moving air from the outside of the contained area to the inside. The units “suck” air through the HEPA filter, trapping asbestos and other fibers. The air that is processed through the units is usually exhausted to the outside of the building whenever possible. The created negative pressure acts to pull air inside the contained area, and prevents fibers from escaping to the outside.

Only personnel trained and familiar with negative pressure filtration devices will use and maintain this equipment. Machines will be stored with the intake and exhaust ducts plugged and taped to prevent any fiber release. An appropriate warning label will be placed on the equipment. Decontamination of the exterior or the replacement of filters will only be performed in a designated work area. Transportation of equipment to a designated area will be performed after sealing the unit with 6-mil plastic. Decontamination will be done by HEPA vacuuming the exterior surface followed by wet wiping with amended water. Water and rags will be disposed of as contaminated waste. Filters will be removed with great care after misting them with amended water, and will be disposed of as contaminated waste. HEPA filters should be changed periodically depending on the volume of usage. Manufacturer instructions will be followed for all maintenance performed on negative pressure filtration devices. Records will be maintained for all service performed and filter replacements.

5.3 AMENDED WATER

All O&M activities will be performed utilizing wet methods, which involves treating the material with "amended" water solution. Amended water contains regular tap water plus a solution that is referred to as a wetting agent, like soap. This wetting agent may be 50% polyoxyethylene ether and 50% polyethylene ether or appropriate substitute mixed in a concentration of 1 fluid ounce to 5 gallons of water or as specified by its manufacturer. This will be applied using an airless sprayer that will deliver 1 gallon per minute at no greater than 400 psi pressure. If an airless sprayer is not available for smaller O&M projects, the use of hand use spray bottles will be acceptable.

5.4 ENCAPSULANTS

Encapsulants are usually applied to a material, the substrate and the general removal area after ACM has been removed. Once ACM has been removed, the area has been thoroughly cleaned and a visual inspection shows no visible dust remaining, an encapsulant can be applied. It's purpose, in post abatement substrate treatment, is to "knock-down and lock-in" any remaining asbestos fibers AFTER the area has been thoroughly cleaned and inspected.

Encapsulants are also used as a method to control asbestos fibers from being released from a surfacing ACM (usually fireproofing or spray-applied acoustic material). These procedures should only be performed by professional asbestos abatement contractors who are properly trained and very familiar with the specific encapsulant's application procedures. Encapsulants will not be applied to any surfacing ACM (spray-applied acoustic, fireproofing, plaster, etc.) unless: (1) the asbestos surface has first been tested and approved for substrate adhesion and/or encapsulant penetration, OR (2) the encapsulant has been certified by Underwriters Laboratories to be a rated component of the fireproofing system. Encapsulants will not be applied to any surfacing ACM which has been water damaged, which are subject to water or physical damage after encapsulation, or which exhibit any signs of delamination or deterioration. Encapsulants add weight to the material applied and could cause delamination and failure of the surfacing ACM if improperly applied.

The following is a general procedure for encapsulation on ACMs other than following removal for knock-down/lock-in" purposes. Isolate and clean the work area by HEPA vacuuming and/or wet wiping to remove accumulated dust and fibers. Place 6 mil poly on the floor under the work area. Apply one coat of penetrating encapsulant per the manufacturer's recommendations. Apply tinted bridging encapsulant per the manufacturer's recommendations. If necessary, apply nylon netting around edges of pipes and fittings. Ensure that the encapsulant penetrates the netting. Apply a second

coat of encapsulant (of another color if desired) after the first has dried. Dispose of all waste and poly on floor in 6 mil labeled disposal bags upon completion of the work. Remove excess air from the bag with the HEPA vacuum, twist the bag closed, and seal with duct tape. Area barriers, where applicable, will not be removed until air samples have been analyzed and clearance is given.

All personnel must decontaminate following the encapsulation procedures.

6.0 PROJECT CLASSIFICATIONS & WORK PROCEDURES

The work that will be performed in association with the ACM can be separated into many different classifications. Federal Occupational Safety and Health Administration (OSHA) and California OSHA have enacted standards to protect workers from exposure to asbestos in the workplace. The standards for the construction and shipyard industries classify the hazards of asbestos work activities and prescribe particular requirements for each classification. As indicated in Section 3.0 of this O&M, OSHA Work Classifications are as follows:

OSHA Class I is the most potentially hazardous class of asbestos jobs and involves the removal of thermal system insulation and sprayed-on or troweled-on surfacing asbestos-containing materials or presumed asbestos-containing materials.

OSHA Class II includes the removal of other types of asbestos-containing materials that are not thermal system insulation, such as resilient flooring and roofing materials containing asbestos.

OSHA Class III focuses on repair and maintenance operations where asbestos-containing or presumed asbestos-containing materials are disturbed.

OSHA Class IV pertains to custodial activities where employees clean up asbestos-containing waste and debris.

The EPA NESHAP regulation places asbestos-containing materials into the following three categories.

NESHAPS RACM means friable asbestos material, NESHAPS Category I material that has become friable or has been subjected to pulverizing, grinding, chipping, sanding or abrading, or NESHAPS Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act upon the material during the course of renovation or demolition.

NESHAPS Category I means non-friable ACM, examples include resilient floor coverings and adhesives, asphalt roofing products, packings and gaskets, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

NESHAPS Category II means all other non-friable ACM; examples include drywall and asbestos cement products.

6.1 OSHA CLASS I WORK – REMOVAL OF FRIABLE TSI & SURFACING MATERIALS

Class I work is the most potentially hazardous class of asbestos jobs and involves the removal of thermal system insulation and sprayed-on or troweled-on surfacing asbestos-containing materials or presumed asbestos-containing materials, regardless of the purpose of the work. These materials are also known as NESHAPS regulated asbestos containing materials (RACM) or friable ACM.

All Class I work is considered major asbestos abatement and will be performed by a licensed asbestos abatement contractor. This work requires specialized procedures and equipment that should only used by trained and certified abatement contractors. The APM shall ensure that all work performed by private asbestos abatement contractors involving RACM or friable ACMs is compliance with the appropriate work procedures. In addition, a CAC should be hired to develop project specifications, to assist with contract administration and to provide contractor oversight during the abatement project.

The specific procedures associated with Class I work are very detailed and will not be covered in this O&M Plan because the work will be not be performed by O&M employees.

6.2 OSHA CLASS II WORK – REMOVAL OF CATEGORY I & II NONFRIABLES

Class II work includes the removal of other types of asbestos-containing materials that are non-friable regardless of the purpose of the work. Class II work applies to NESHAPS Category I (Regulated Asbestos Containing Materials – RACM) and Category II non-friable ACMs. Class II work involving the removal of over 100 square feet of ACM should be performed by an asbestos abatement contractor. Removal of less than 100 square feet of material can be undertaken by facility O&M Workers. For further information see Section 6.3 – OSHA Class III Work - Repair & Maintenance Work.

NESHAPS Category I ACMs are those that are intact, and cannot be pulverized, when dry, by hand pressure. Example include Vinyl Asbestos floor Tiles (VAT), Vinyl Floor Covering (VFC), VAT/VFC adhesive and Transite/asbestos cement products which are presently intact. NESHAPS Category II non-friable materials are those that are presently intact and during the course of renovation would or have the potential to become friable. Examples include drywall/joint compound and wall plaster.

6.3 OSHA CLASS III WORK – REPAIR & MAINTENANCE

All of the ACM removal work that will be performed by facility staff will fall under Class III and Class IV work.

Class III work includes repair and maintenance operations where asbestos-containing or presumed asbestos-containing materials are disturbed to repair another system component. These ACMs include both RACM (friable TSI and surfacing materials and non-friable ACM. The quantity limit for repair and maintenance work is the amount that will fit into one 60” by 60” glove bag, which is estimated at approximately 100 square feet. Work involving removal/ disturbance of ACM that exceeds 100 square feet must be performed by a licensed asbestos abatement contractor.

To perform Class III work O&M Workers must complete an initial 16 hour operations and maintenance training for maintenance workers involved in general maintenance and asbestos material repair tasks as described in Section 3.0.

OSHA Class III works is typically expected to be of small scale and short duration.

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work shall be performed using wet methods. To the extent feasible, the work shall be performed using negative air machines. Where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material, impermeable dropcloths shall be used, and the work shall be performed using mini-enclosures or glove bag systems or another isolation method.

If a "negative exposure assessment" can not be provided documenting low airborne fiber exposures on similar work, or where air monitoring results show that the PEL has been exceeded, the work areas shall be contained using impermeable dropcloths and plastic barriers or their equivalent, or shall isolate the work area using a formal control system. This work may need to be performed by a licensed asbestos abatement contractor.

O&M Workers performing Class III jobs, which involve the disturbance of thermal system insulation or surfacing material, or where the employer does not produce a "negative exposure assessment" or where monitoring results show a PEL has been exceeded, shall wear respirators which are selected, used and fitted in accordance with OSHA regulations.

Provisions must be made to ensure compliance with all applicable codes and regulations, such as Fire, Building, and OSHA regulations.

Class III work can be subdivided into work involving (a) friable ACM and (b) non-friable ACM. Different procedures should be used when removing these different types of ACM.

6.3.1 FRIABLE ACM REMOVAL

If an ACM is, when dry, capable of being crumbled, pulverized or reduced to a powder by hand pressure, it is considered friable ACM and must be treated as potentially very hazardous.

The following steps shall be taken for any work that may involve disturbing or removing friable ACM.

1. All personnel who are likely to disturb friable ACM or who may be exposed above the permissible exposure limits (PELs) must be properly trained and protected.

2. Restrict entry to the area to only those needed to perform the work.

3. Post signs to communicate the hazard and to prevent entry by unauthorized personnel.

4. Shut off or temporarily modify the air handling system, and restrict other sources of air movement in the work area.

5. Isolate the area where the ACM is located and will be removed. Place barrier tape across the doorways and at least 20 feet around the area where the ACM is located. Non-movable items will be sealed with 6-mil plastic and sealed to the floor with duct tape to prevent contamination. Contain the areas with polyethylene tape and install critical barriers as necessary. Install a 3-stage decontamination unit off the containment area that will be used by all O&M workers to enter and exit the area.

6. Use work practices (e.g., glove bag procedures, HEPA vacuum, wet methods, mini-enclosures, as described herein) which are designed to prevent the spread of any fibers released by the work being performed.

7. Plan to containerize the removed materials using an approved 6 mil plastic bag or an approved glove bag. The "Glovebag" method provides a safe means for removal of small amounts of ACM on pipes and in small surface areas. Section 6.3.2 sets forth specific procedures that should be followed when the glovebag method is used to remove ACM.

8. Don personal protective clothing, such as the "Tyvek" suits, and gloves.

9. Start air sampling for the required personal exposure monitoring.

10. Place 6-mil plastic sheeting under the areas or the glove bag set-up.

11. Ensure that all ventilation units that service the area where the ACM is located are shut off and tagged out.

12. Don the respirator and perform a "negative" and "positive" pressure checks. If you are unable to obtain a successful pressure test on the respirator, see your supervisor. DO NOT PROCEED WITH ACM WORK WITHOUT PROPER RESPIRATOR FIT.

13. Move to the area where the ACM is to be removed. Either install a glove bag using the Glove Bag procedures or proceed with material removal.

14. Wet the ACM completely prior to removal and keep the ACM wet during the removal process. Use amended water in an airless spray pump. A hand spray bottle may also be used. Use the HEPA vacuum to continually remove small debris and settled dust.

15. All visible ACM must be removed from the areas using appropriate tools that could include scrapers, hard brushes, etc. Use amended water to wet wipe the area where asbestos was removed. Special attention must be given to exposed ends of pipe lagging. Use spray encapsulant to seal the areas after cleaning has been performed and all visible debris has been removed from the component.

16. Place asbestos material debris inside a 6-mil bag. Wet wipe the surrounding area with disposable rags and place rags and any other contaminated materials (including tools that can not be effective cleaned) into the 6-mil bag.

17. Floors and horizontal surfaces in areas where ACMs are removed shall be wet mopped/ wiped and cleaned with a HEPA vacuum. Discard mop heads and wipe cloths as asbestos waste in the 6-mil bag. Dry sweeping of floors is prohibited in areas containing asbestos to minimize re-entrainment of asbestos fibers in the air.

18. Wet the inside of the bag with amended water and place the vacuum nozzle into the bag to cause the bag to collapse. Seal the collapsed bag with a gooseneck style seal. Place the bag into another 6-mil asbestos waste bag and seal tightly. This bag must be marked as an ASBESTOS DISPOSAL BAG with the proper Danger and warning labels:
DANGER Contains Asbestos Fibers
Avoid Creating Dust Cancer and Lung Disease Hazard.

19. The exposed section of pipe or other remaining ACM should now be closed and sealed with a non-asbestos material.

20. If the remaining pipe/material contains ACM, the pipe must be labeled "DANGER ASBESTOS MATERIAL."

21. Employees will always decontaminate themselves by HEPA vacuuming and wet wiping every time they leave the work area. The O&M Supervisor will instruct each employee at the onset of a project as to which decontamination methods will be utilized. At a minimum, HEPA vacuuming of clothing and wet wiping of skin surfaces, respirators, shoes, hard hats will be employed.

22. Any work involving vinyl asbestos floor tile may also involve the removal of asbestos-contaminated glue or mastic, which was originally used as an adhesive on the floor tiles. The floor tile materials can usually be popped up using a device specifically designed to dislodge floor tiles. The mastic or glue left behind can sometimes be much harder to remove. Different organic solvents are available from vendors to remove the mastic. The solvent must be allowed proper contact time to soak into the glue and help dissolve the material.

23. Perform clearance monitoring at the completion of asbestos work as deemed necessary by the APM.

6.3.2 GLOVEBAG REMOVAL

A glovebag is a plastic bag with special arm holes with gloved ends that allow one person (sometimes two people) to insert their hands and perform asbestos removal work while remaining isolated from the ACM. Glovebags are usually used for thermal system insulation removal.

A glovebag may not be used for more than one single application. Electrical equipment below the level of the glovebag or within arm's reach of glovebag must be deactivated. All electrical equipment used by the workers must be provided with GFI protection. A minimum of two people will be required to perform all glovebag removal projects. Personnel involved in glovebag abatement will be required to: (1) wear appropriate personal protective equipment (e.g., proper respiratory protection and full-body protection) in accordance with applicable regulations and (2) fully utilize a decontamination unit which is located adjacent to the work area. This decontamination unit must meet the requirements outlined in this manual.

To prevent contamination of the building environment, the work area where glovebagging is to be performed must be isolated from the rest of the building environment.

Four classifications and procedures for glovebagging are as follows:

Unoccupied Areas
Areas such as equipment rooms, attics, pipe chases, etc., will require critical barriers over doorways, windows, tunnel accesses, etc., to isolate the area from the rest of the building. Critical barriers will be constructed by a single layer of 6-mil poly. Where critical barriers are not feasible, two layers of 6-mil poly will be laid down on the floor, barrier tape will be put up to identify the work area, and the glovebag will be carefully smoke tested and maintained under negative pressure for the duration of the job.

Occupied Areas
Areas such as offices, public bathrooms, etc., can present special problems. The functional area involved will be evacuated of the general public. Critical barriers will be installed as appropriate. Movable items will be cleaned with a HEPA-filtered vacuum and wet wiped to remove any asbestos-containing dust, and moved out of the functional area. Non-movable items will be sealed with 6-mil plastic and sealed to the floor with duct tape to prevent contamination. If the functional area cannot be evacuated, then a separate work area can be constructed using 6-mil plastic and the necessary support frame. When this is done, background air samples of occupied areas selected by the APM will be taken throughout the duration of the project.

Equipment Rooms Common with Return or Makeup with HVAC System
Any glovebag work to be done in an equipment room where the HVAC system's return or makeup air is common with the equipment room, the system will be shut down and critical barriers will be installed on the return air or makeup grills. If the system cannot be turned off, a wall will be constructed in such a manner as to separate the building's air flow from the equipment room air. Walls will be constructed using a single 6-mil layer of poly.

Special Cases
Certain situations such as utility tunnels provide a unique situation in which critical barriers or separate work areas are not feasible. When this situation arises two layers of 6-mil poly will be laid down on the floor, barrier tape will be put up to identify the work area, and the glovebag will be carefully smoke tested and maintained under negative pressure throughout the duration of the job.

Tools required for glovebag operations include: 2 knives (one inside and one outside the glove bag), brush, pair wire cutters, bone saw for cutting around pipe insulation, HEPA vacuum, penetrating encapsulant in a hand sprayer, bridging encapsulant prepared and placed in baggies when edges of ACM pipe material will remain, smoke tubes and aspirator bulbs, rags or paper towels, duct tape, several glovebags in case in the first one is damaged, 1 hand sprayer or spray bottle with amended water, and 6 mil plastic film.

The integrity of the pipe where the work is to be performed will be checked to determine if loose pipe lagging several feet or even yards away from the work could be jarred loose by the activity. Loose or questionable areas will be wrapped with two layers of 6 mil poly and taped before glovebagging. No glovebagging will be done if a fiber release situation already exists until the fiber release is cleaned up. The APM is to be contacted if this is the case.

The temperature of the piping will be checked. These procedures only apply to pipe temperatures of 150 °F or less. ACM on TSI with temperatures exceeding 150 °F shall be performed by a licensed asbestos abatement contractor.

Place signs and warning tape around work area to avoid accidental entry by personnel or building occupants. Turn off or lockdown all air-handling units, gas and electrical services to the work area. All HVAC systems will be shut down, or if impractical, modified and sealed with critical barriers. Place two layers of 6 mil poly under the pipe to be glovebagged. The size will be equal to twice the length of the glovebag used in all four directions as measured from the center of where the glovebag will be. If the area where work is being performed is smaller than these requirements, then run poly to the walls and overlap the wall one foot up. HEPA vacuum and wet wipe the pipe insulation directly over the poly. Wrap one layer of duct tape around the pipe at each location where glovebag will be attached. Cut down sides of glovebag to accommodate the pipe diameter. Cut far enough so as to leave ample working space on the top of pipe inside the bag. Place tools into tool pouch. Place glovebag around section of pipe insulation to be removed, fold the top together and seal it with duct tape. Duct tape the ends of the glovebag to the previously wrapped tape. Insert the wand from the hand sprayer through the water sleeve. Water sleeve can be made by making a small slit in the side of the bag in line with the vacuum sleeve, tape wand to bag. Alternatively, a spray bottle of amended water previously placed in the tool pouch may be utilized. Using the smoke tube and aspirator bulb, place tube into the vacuum sleeve, fill bag with smoke. Remove the smoke tube and twist vacuum sleeve closed.

While holding the vacuum sleeve tightly, gently squeeze the glovebag and look for any leaks. If leaks are found, they will be repaired and the bag retested until there are no leaks. Attach nozzle of HEPA vacuum, using tape, through the vacuum sleeve, turn on the vacuum only slightly to put negative pressure on the side of the bag, being careful not to collapse the bag. Using the sprayer with amended water, spray the outside surface of insulation thoroughly. Use bone saw to cut the insulation of each end of the section inside the glovebag. Throughout this process, amended water is to be applied to the cutting area to keep dust to a minimum. Once ends are cut, the section should be slit from end to end using the utility knife. The cut will be made along the bottom of the pipe, or in its natural seam if found with amended water continuously applied to

prevent dry fibers. Some insulation will have wire or steel bands that will have to be clipped with wire cutters as well. When finished, spray and clean the tools and place back into tool pouch. Lift the insulation from the pipe carefully and gently place in the bottom of glovebag. Place it so the driest area is pointing up and wet it down thoroughly with the sprayer. Use the brush, rags or paper towels, and amended water to scrub and wipe down the exposed piping until no visible residue remains. The putty knife will be used to scrape hardened material. Wipe down the top and sides of the glovebag interior and push all visible residue to the lowest possible part of the glovebag. Encapsulate the exposed ends of remaining ACM insulation with bridging encapsulant. Encapsulate bare piping and non-ACM contaminated pipe wrap with penetrating encapsulant. Place reusable tools into one or more of the gloves and pull sleeve inside out. Twist sleeve tightly between tools and bag body. Wrap duct tape on twisted portion and cut the sleeve through the taped twisted section. The contaminated tools may be placed directly into the next glovebag or may be decontaminated by submerging in a bucket of soapy water. Open glove under water and clean and dry tools. Waste and sleeve will be disposed of as contaminated waste. Rags or paper towels cannot be reused or cleaned and will be left in the glovebag. Turn on the HEPA vacuum and collapse glovebag. Remove spray wand from bag and place hand over hole to prevent vacuum loss. Remove vacuum nozzle from bag again, holding hole to prevent loss of vacuum. With the removed insulation in the bottom of the bag, twist the bag several times and tape together, separating the top from the bottom of the bag. Slip a 6 mil disposal bag over the glovebag (still attached to pipe). Remove the tape and open the top of the glovebag as the HEPA vacuum is being run with the opening. Cut glovebag loose from pipe and fold it down into the disposal bag. Twist the top of the disposal bag closed after removing excess air from bag with the HEPA vacuum and seal with duct tape, making a goose neck. To be ready for disposal, glovebags will be double bagged and the bag will have the appropriate warning label.

If problems develop with a glovebag preventing completion of work and the ACM has been distributed within the glovebag, but no outside breach has occurred, then collapse the glovebag and proceed with the removal steps up to cutting the bag loose from the pipe. Then, place a second glovebag over the first bag and proceed, removing the first glovebag and the ACM with the second glovebag. When using glovebags, leave sufficient slack so that in an emergency another bag can be put over it to finish work. Minor tears that may occur in the glovebag can be taped up because of the negative pressure inside the bag. If a tear develops, coordination will be needed between both employees, one patching the tear while the other operates HEPA vacuum on and off to maintain negative pressure without collapsing the bag. If a spill occurs, such as material leaving the glovebag and falling on the floor, or visible fibers escaping through a tear, if the material has fallen on the poly on the floor, then ensure it is well saturated and fold the corners of the first layer over the material and tape closed. Proceed with the removal procedures of the glovebag. Contact the APM to report a fiber release who will contact

the ODOL by telephone. Employees shall never stop in the middle of a glovebag procedure and leave friable ACM exposed to the work area unless there is an immediate danger to life or health. Employees must seal off the exposed ACM first, then report the fiber release episode.

6.3.3 NON-FRIABLE ACM REMOVAL

Removal of Category I & II non-friable materials in quantities less than 100 square feet for repair or maintenance activities is considered minor asbestos abatement activity. The following steps shall be taken for any work that may involve disturbing non-friable ACM.

1. All personnel who are likely to disturb ACM or who may be exposed above the permissible exposure limit (PEL) must be properly trained and protected.

2. Restrict entry to the area for all personnel other than those needed to perform the work.

3. Post signs to communicate the hazard and to prevent entry by unauthorized personnel.

4. Shut off or temporarily block vents to/from the air handling system, and restrict other sources of air movement.

5. Use work practices (e.g., negative pressure enclosure, glove bag procedures, wet methods as described herein) which are designed to prevent the spread of any fibers released by the work being performed.

6. Plan to containerize the removed materials using an approved 6 mil plastic bag.

7. Don personal protective clothing, such as the "Tyvek" suits, and gloves.

8. Start air sampling for the required personal exposure monitoring.

9. Isolate the work area where the ACM is located. Place barrier tape across the doorways and at least 20 feet around the area where the ACM is located. Install critical barriers using polyethylene sheeting. Install a decontamination unit that will be used by all O&M personnel who enter and exit the work area.

10. Place 6-mil plastic sheeting under the area, if applicable.

11. Don the respirator and perform a "negative" and "positive" pressure test. If you are unable to obtain a successful pressure test on the respirator, see your supervisor. DO NOT PROCEED WITH ACM WORK WITHOUT PROPER RESPIRATOR FIT.

12. Move to the area where the ACM is to be removed.

13. Wet the ACM completely prior to removal and keep the ACM wet during the removal process. Use amended water in an airless spray pump if possible. A hand spray bottle may also be used. Use the HEPA vacuum to continually remove small debris and settled dust.

14. All visible ACM must be removed from the areas using appropriate tools that could include scrapers, hard brushes, etc. Use amended water to wet wipe the area where asbestos was removed. Use spray encapsulant to seal the areas after cleaning has been performed and all visible debris has been removed from the component.

15. Place asbestos material debris inside a 6-mil bag. Wet wipe the surrounding area with disposable rags and place rags and any other contaminated materials (including tools that can not be effective cleaned) into the 6-mil bag.

16. Floors and horizontal surfaces in areas where ACMs are removed shall be wet mopped/ wiped and cleaned with a HEPA vacuum. Discard mop heads and wipe cloths as asbestos waste in the 6-mil bag. Dry sweeping of floors is prohibited in areas containing asbestos to minimize re-entrainment of asbestos fibers in the air.

17. Wet the inside of the bag with amended water and place the vacuum nozzle into the bag to cause the bag to collapse. Seal the collapsed bag shut with duct tape. Place the bag into another 6-mil asbestos waste bag and seal tightly with duct tape. These bags must be marked with the proper Danger and warning labels: DANGER Contains Asbestos Fibers Avoid Creating Dust Cancer and Lung Disease Hazard.

18. Employees will always decontaminate themselves by HEPA vacuuming and wet wiping every time they leave the work area. The O&M Supervisor will instruct each employee at the onset of a project as to the specific decontamination methods that will be utilized. At a minimum, HEPA vacuuming of clothing and wet wiping of skin surfaces, respirators, shoes, hard hats will be employed.

19. Any work involving vinyl asbestos floor tile may also involve the removal of ACM glue or mastic, which was originally used as an adhesive on the floor tiles. The floor tile materials can usually be popped up using a device specifically designed to dislodge floor tiles. The mastic or glue left behind can sometimes be much harder to remove. Different

organic solvents are available from vendors to remove the mastic. The solvent must be allowed proper contact time to soak into the glue and help dissolve the material.

6.3.4 FLOOR TILE PROCEDURES

Whenever possible, ACM floor tile will be left in place. If removal of floor tile is necessary, it will be performed so that it will not become friable and will not be subjected to sanding, grinding, cutting or abrading. If floor tile must be subjecting to sanding, grinding, cutting or abrading or will become friable during removal, a licensed asbestos abatement contractor will be hired to perform removal under appropriate abatement conditions.

Non-friable floor tile removal (exceeding 100 square feet) will be done in accordance with the procedures for Class II removal and will include the following:

A current negative exposure assessment (within 12 months of the project) consisting of air monitoring of a similar project showing the PEL and excursion limit are not anticipated to be exceeded must be in place for the following procedures to apply.

All Class III floor tile removal will be conducted in a regulated area demarcated and with limited access. All Class III floor tile removal will be supervised by a competent person (Asbestos Supervisor) as defined by this program. All workers performing floor tile removal will be properly trained. Floor tile will be wetted with amended water. Tiles will be removed intact wherever possible and placed in labeled 6-mil polyethylene bags for disposal at an approved landfill. Rough spots on adhesive (if it contains asbestos) may be scraped using wet methods with a blade or putty knife, but must not be sanded.

Asbestos-containing flooring or its backing shall not be sanded. Sanding of adhesive containing asbestos may be done only by a licensed asbestos abatement contractor under full negative pressure containment.

6.4 OSHA CLASS IV WORK – CUSTODIAL WORK TO CLEAN UP ACM

Class IV pertains to custodial activities where employees clean up asbestos-containing debris.

To perform Class IV work custodial workers must complete an initial 2-hour general awareness training designed for custodial workers having potential of working in proximity to asbestos-containing materials (ACM). All Class IV jobs shall be conducted in conformity with the OSHA requirements which mandate wet methods, HEPA vacuums, and prompt clean up of debris containing ACM or PACM.

Employees cleaning up ACM debris and waste in a regulated area where respirators are required shall wear respirators which are selected, used and fitted pursuant to OSHA requirements.

6.5 EMERGENCY REMOVAL PROCEDURES

If disturbance of ACM occurs during any non-asbestos abatement activity, the following procedures will be followed:

The APM must be immediately notified. The APM will notify trained personnel (either licensed asbestos abatement contractor personnel or O&M personnel) who will respond and isolate the area, assist in decontaminating affected employees and in the general cleaning up.

Personnel in the immediate area who could have become contaminated should not leave the immediate area because they will track the ACM to other locations, contaminating those areas as well. Any areas where potentially contaminated people walk will need to be fully decontaminated. Because asbestos is an inhalation-based hazard, it is essential to move slowly and create as little dust as possible. Never brush or shake ACM debris from clothing or equipment as you will create asbestos-containing breathable dust. Gently remove large pieces of debris from clothing by hand and leave it on the floor in the spill area. A non-contaminated employee should bring plastic bags and suitable duct tape to the spill areas. To prevent tracking the ACM debris over a wider area, exposed personnel should place plastic bags over their shoes and secure the bag to their pants with the duct tape. It is important to not step on any fallen debris after placing the bags over shoes. Proceed to a “cleaner” area. Stay put until trained employees arrive to HEPA vacuum your clothing and provide you with wet towels to wipe your exposed skin, shoes and clothing.

Minimize further contamination once leaving the work area by avoiding any created dust.

Responding personnel will restrict traffic through the area. Any air movement spreads the small asbestos fibers further from the damage site. Airborne asbestos fibers pose a health threat to anyone who may walk through the area.

Responding personnel will shut off the HVAC equipment servicing the affected areas, if possible. Airborne asbestos fibers can be sucked into HVAC ducts and then discharged into other areas of the building, spreading asbestos fiber contamination. All air filters servicing the affected zone should be replaced and discarded as asbestos-contaminated material, if the HVAC system was in operation during the release.

Responding personnel will determine the extent of contamination. Air samples may need to be taken in the areas serviced by the HVAC zone and adjacent areas if the release is extensive.

All response workers entering an emergency clean-up zone are required to wear the appropriate personal protective equipment. The same hazards that are associated with asbestos removal are also applicable to damaged ACM clean-up. There will be an immediate increase in airborne asbestos fiber counts; however, dispersion will likely reduce the fiber count to concentrations below 0.1 f/cc.

For releases involving friable material – the loose material should be moistened with an airless type spray bottle, then scraped off. A PVC framed catcher using a sheet of polyethylene with an attached HEPA vacuum is a useful tool in this case. Hold the catcher directly under and as close a possible to the area that you are scraping. This device helps to control the airborne fiber count and is very useful if scraping must be done over a difficult to clean work area. Once all loose asbestos has been removed from the damaged area, it is necessary to begin cleaning the material that has already fallen, starting at the highest locations first. Wet wipe the top of partitions, desks, file cabinets or other office furniture thoroughly. Clean the floor last by scooping all large pieces of asbestos containing material into disposable 6 mil bags. HEPA vacuum and wet wipe. All visible traces of fallen material must be removed.

For releases involving floor tile – the ACM floor tiles shall be disposed of as asbestos waste. Remaining exposed tiles should be encapsulated prior to replacement. New tiles shall be asbestos-free. Vinyl tile sheets that have been damaged should be patched with a caulk or polyurethane filler if not being removed.

For releases involving asbestos cement panels and pipe – Asbestos in these materials is contained within a cement matrix that will not easily release fibers. Damage that results in breakage was probably severe. Broken fragments should be disposed of as contaminated waste. Residual debris shall be HEPA vacuumed and wet wiped. The remaining material will then need to be encapsulated.

Hard to clean areas will require special attention. If something cannot be cleaned or is very difficult to clean, it should be disposed of as asbestos-containing material. Carpets and fabric-covered desk chairs may require specialized steam cleaning.

6.6 MINI ENCLOSURE PROCEDURES

Mini-enclosures are used in areas where glovebags and/or full containment are not possible due to space limitation or configuration challenges. A mini-enclosure can be

portable and created to be moved from location to location (after proper decontamination).

Mini-enclosures are to be constructed with double layers of 6 mil plastic sheeting.

Mini-enclosures will be equipped with negative pressure filtration devices. A HEPA vacuum can be utilized if the enclosure is small enough. For example, a HEPA vacuum can that runs at 105 cubic feet per minute (cfm) can provide four air changes per hour for a mini-enclosure that is 12' by 12' by 8'. Four air changes per hour are required. If the enclosure is too large for the HEPA vacuum to create the proper negative pressure, a negative pressure filtration device should be used.

The amount of surfacing or thermal insulation which may be removed within a mini-enclosure shall be limited to 10 square feet, which need not be contiguous.

Mini-enclosures for the removal of miscellaneous friable asbestos materials shall be limited in size to 100 square feet.

Critical barriers will be erected within the mini-enclosure, if applicable.

All electrical power within arm's reach of asbestos workers in a mini-enclosure must be locked out in accordance with Lockout/Tagout (LOTO) procedures.

A small change room approximately three feet square made of 6 mil poly will be contiguous to the mini enclosure to allow the worker to vacuum off the protective clothing and to change suits before proceeding to the to shower.

6.7 UTILITY TUNNEL PROCEDURES

These procedures are to be used for cleanup, repairs and limited removal of ACM thermal insulation in tunnels. These procedures are only to be used with the advance notification and consent of the APM and in tunnel areas containing an airborne fiber concentration of less than 0.01 f/cc.

All prep work within the tunnel will be performed by workers in full protective clothing and wearing, as a minimum, a full face air purifying respirator. Daily monitoring for heat stress will occur. Cool vests may be worn when the tunnel ambient temperature exceeds 105 °F, or when it is suspected that the interior suit temperature will increase above the worker comfort range as indicated by heat stress monitoring.

The project must be evaluated and approved by a Certified Industrial Hygienist (CIH) to ensure that there are not hazards associated with confined space entry, low oxygen environments, toxic gas sources, carbon monoxide sources, etc.

A work area will be established by barrier attached across the tunnel (side to side) at each approach to the area.

A minimum of three workers are required to perform these procedures. One worker will remain outside the work area for emergency assistance and to drive a vehicle for transport to the central decontamination station if needed.

If available, tunnel lighting system(s) will remain on during these-projects and will afford some project lighting. However, additional temporary lighting may be required.

Work requests for any electrical systems must include procedures for protecting workers from the risk of electrical shock and must be approved by an electrical engineer. Electric conduit or electrical lines that penetrate the work area will be wrapped or isolated with 6 mil plastic throughout the work area and will extend 6 feet outside the work area in each direction.

Temporary lighting systems, along with any other electrical tools and equipment, will be on ground fault circuit interrupters connected to circuits that are outside of the work area.

Any standing water in the work area will be properly removed before any abatement begins.

Pressure differential machine(s) will be placed outside at one end of the work area. Machine exhaust will always point the opposite direction to the nearest building entrance. Makeup air will be obtained through the tunnel access hatches or adjacent mechanical rooms. A single layer of 6 mil poly will be taped to the floor just outside of the work area at the other end for the workers to change suits on.

Barricades will be placed around all open tunnel hatches when used for make-up air. Barricades are to prevent the general public or students from accidentally stepping into an open hole.

Once the pressure differential machine(s) has been turned on and cleanup has begun, it will remain on until work has been completed and the area has passed clearance testing.

The utility tunnels provide a unique situation because critical barriers or separate work areas are not usually feasible. When this situation arises two layers of 6 mil poly will be

laid down on the floor, barrier tape will be put up to identify the work area, and the glovebag will be carefully smoke tested and maintained under negative pressure throughout the duration of the job.

In the event of a fiber release in the utility tunnel system, emergency cleanup procedures must be followed.

7.0 DECONTAMINATION PROCEDURES

Work involving removal of ACMs shall utilize a 3-stage decontamination unit. It may be constructed on site or portable so it can be moved from location to location. This unit will consist of a clean room, shower area, and dirty room separated by air-locks made of double sheets of 6-mil plastic and will meet the requirements specified in the regulatory guidelines. At least ten foot-candles of illumination will be provided in all areas of the decontamination unit.

Decontamination procedures are as follows: exit the work area and move into the “dirty room” of the decontamination unit. Employees will remove their disposable suit in the dirty room and, while leaving their respirator on, proceed into the shower room. Employees will shower and remove their respirator after they have washed themselves and the exterior of the respirator. Respirator filter cartridges will be removed (and disposed of as contaminated waste) and will be placed back into the dirty room. After showering and removed their respirator, employees will proceed to the clean room and don their street clothing.

The decontamination facility will be constructed so as to permit use by either sex without embarrassment or harassment. All shower water waste will be collected and filtered before discharge with 0.3 micron filter. The shower filter and residue will be disposed of as asbestos-contaminated material. The shower will have hot and cold water supplied from the building's existing domestic hot and cold water lines. A liquid soap dispenser will be provided in the shower. The shower will be stable, free of sharp edges, and trip or fall hazards. Shower grates will be constructed of non-porous materials. At least ten foot-candles of illumination will be provided in all areas of the decontamination unit. Negative pressure will be created by a HEPA filtered suction device and a flow of make-up air from the clean room through the shower into the dirty room will be maintained at all times. The temperature of the clean room and the shower will be maintained above 50 °F.

8.0 AIR CLEARANCE - AFTER PROJECT COMPLETION

The APM should inspect all areas after asbestos removal has been completed, the area has been thoroughly cleaned and encapsulation has been applied. Once the APM is satisfied that the area is adequately cleaned, clearance air sampling should be performed by a qualified and trained person. This person can be the APM or a Certified Asbestos Consultant or another qualified designee.

Airborne fiber counts should be less than 0.01 f/cc by PCM before the area is released for unrestricted use.

9.0 WASTE DISPOSAL

ACM must be thoroughly wet prior to removal/disturbance and throughout the removal activity, containerization, transportation and unloading of the material at the designated waste disposal site. The waste must be packaged and transported in accordance with all applicable regulations. The disposal location of the removed ACM will be dependent upon the friability or potential friability of the material and presence or absence of solvents.

9.1 ADEQUATE WETTING

Once the asbestos-containing waste material has been removed from a work area there are certain precautions that must be taken before disposal operations begin. The first, and probably the most important, is to ensure that all of the asbestos-containing waste has been thoroughly treated-wetted with amended water. As the asbestos-containing material is being removed, the material should be kept as damp as possible using amended water. By ensuring this, the chances of airborne asbestos fiber generation are significantly reduced. The waste material will then be suitable for containerizing.

9.2 CONTAINERIZING

The safest and most effective way to ensure that the asbestos-containing waste has been properly packaged for transportation to the disposal site is to establish a standard procedure for bagging and handling the waste. The first step in this procedure would be to obtain the appropriate disposal bags (6 mil polyethylene bags are required). These will be air-tight and puncture resistant. Also, regardless of the material type (NESHAPS - RACM, Category I non-friable, or Category II non-friable) these containers (bags) should be labeled with the OSHA required statement:

DANGER
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard

Once this preparation is completed, the next step is to use the proper techniques for containerizing the waste materials. Important concepts of this training should include:

Discuss of the importance of handling asbestos-containing waste in a careful manner to keep airborne fiber generation minimal.

Provide instruction on which materials should not be included in the bags (i.e., metal, sharp objects), and also that each bag should be considered "full" when it is half filled (since material saturated with water will be much heavier than dry material).

Provide instruction on the correct procedures for sealing waste-containing bags with duct tape. Ensure that all excess air is vacuumed out of the bags (with a HEPA vacuum) before they are sealed, to conserve space.

Discuss the importance of ensuring that the asbestos warning label on the outer most disposal bag is legible so that no bags will be disposed of mistakenly as non-ACM.

Once the asbestos-containing waste is securely enclosed inside the bag, a storage location must be chosen. It is often recommended that the best procedure for small quantities (a bag or two) of waste that will need to be stored for more then a day or two is to place the bags in fiberboard or metal drums with locking rims. These drums should be labeled in the same manner as the bags. The most efficient method is to place 2 - 4 bags in each drum depending on size and weight.

9.3 WASTE LOAD-OUT PROCEDURE

The most effective method to use in a removing ACM waste bags from a work area is to utilize two sets of workers; an inside team and an outside team.

The inside team, wearing appropriate respirators and protective clothing will be responsible for ensuring that the bags are intact with no rips or holes, are sealed and are wiped clean on the outside.

The outside team (working in the waste load-out area), wearing dual-cartridge respirators and appropriate protective clothing, will post themselves at the entrance to the work area. The inside team will then pass the bags into the load-out area. From here, the outside team will take possession of the bags and inspect them to ensure that they are intact and clean. The outside team moves the bags to the temporary storage location or loads them directly onto the transport vehicle.

If drums are used to hold the bags until disposal can be arranged, the drums should be moved using drum caddies, hand trucks, dollies, or pull carts. In addition to this, it is important to instruct workers in proper lifting techniques in order to avoid back injuries.

If a storage dumpster or box truck is used for disposal, make sure is properly enclosed. The inside or "bed" area should be lined with 2 layers of 6 mil polyethylene. First, the floor should be completely covered with a six-inch overlap of each piece. The same method should also be used when lining the sides and top of the cargo area also. Duct

tape should be used to properly secure the sheets of polyethylene. This will not only ensure additional enclosure of the asbestos-containing waste, but it will provide for easier clean-up operations. Any dumpster or truck to be used in the transportation of ACM waste should be completely enclosed using this method. It should be noted here that any debris or residue observed on containers or surfaces outside of the work area resulting from disposal activities should be immediately cleaned by using HEPA filtered vacuum equipment and/or wet wiping, as appropriate. The State of California requires trucks transporting asbestos waste be registered as carriers of hazardous waste.

9.4 FRIABLE ASBESTOS WASTE

All ACM that have been determined to be “friable” or will become “friable” during removal operations, must be disposed of as asbestos hazardous waste. This includes wastes classified by NESHAPS as RACM and Category II non-friable. A waste manifest form must be completed which documents the owner of the waste as well as the transporter. The intent of the manifest is to track the waste from “cradle to grave”. The waste manifest forms can be obtained from the transported and/or from the intended disposal facility. They require specific information about the waste, the potential hazards, the recommended handling procedures, the quantity, the origin/oringinal location, the generator’s name, transporter’s name and disposal facility name.

All wastes collected in the HEPA vacuum unit shall be disposed of in accordance with friable waste disposal procedures.

9.5 NONFRIABLE ASBESTOS WASTE

Waste that has been classified as “non-friable” (and with no portential to become friable) can be disposed of as non-hazardous asbestos waste. The EPA considers waste classified as Category I “non-friable” waste. A “Non-Hazardous” waste manifest form typically accompanies this waste stream. The waste manifest forms can be obtained from the transported and/or from the intended disposal facility. They require the same basic information that is required on hazardous waste manifests.

The non-friable asbestos material removed during the activity shall be disposed of in sealed impermeable containers and properly stored in a locked/secured area until disposal is arranged. Labeled plastic bags with asbestos warning labels are required. Each bag must be 6-mil thickness and the waste should be double-bagged to ensure safety.

9.6 OTHER ACM WASTE CONSIDERATIONS

Wallboard/Joint Compound Systems
Wallboard and the associated joint compound, which in combination is called a wallboard system, are suspect ACMs. It is very common for the asbestos content in the wallboard to have no asbestos detected but for the joint compound to have greater than one percent asbestos. During sample collection the two materials are often "composited" into one sample and submitted to the laboratory for analysis as a composite. The result will typically yield a results of less than one percent asbestos for the wallboard system. It is important to note that for a composite sample to be classified as less than one percent, the sample(s) must be point counted in accordance with the PLM Point Counting method. Composite sampling can render the material non-ACM for waste disposal purposes.

It should also be noted that OSHA does not recognize composite sampling/analysis approach. Therefore (although the composite sample result may be less than one percent), the asbestos content in the joint compound will continue to trigger compliance with OSHA asbestos regulations related to work procedures and employee protection.

It must be noted that surface texture that is not part of a joint must be tested separately and not be composited as a wall system.

Bulky ACMs
In any asbestos abatement project, not all of the waste material that needs to be disposed of will be loose or broken apart. There are many cases in which it will be necessary to dispose of intact materials such as asbestos-containing flooring tiles, ceiling tiles, shingles, pipes, etc. The procedures to follow in these instances rely on simply good common sense. Procedures may include neatly banding together tiles or shingles with care not to expose sharp edges or any other protruding objects that could possible puncture the polyethylene enclosure. Once the materials are banded together, each bundle should be wrapped in 2 layers of 6 mil polyethylene. This is often called burrito wrapping or bundle wrapping. When this is complete, the bundles should be neatly stacked in the disposal dumpster. Care should be used so that tipping or shifting of the load is prevented.

Solvents
Some materials (such as flooring adhesives) may be better removed using chemical solvents rather than just wet scraping. If mastic removal solvents are used, this waste must be segregated separately and characterized based on the requirements of EPA SW-846. This waste has typically determined to be a RCRA waste and is then subject to

stabilization prior to disposal. It is recommended that the contractor consult with a knowledgeable consultant or waste hauler if the use of solvents will be used.

9.7 LIQUID ACM WASTES

An aspect that must not be overlooked when devising an asbestos-containing waste disposal strategy is filtering the run-off from showers in the worker decontamination area. It is now generally accepted that filtration of asbestos-contaminated water through 0.3 micron filters is the state-of-the-art for asbestos removal from water. Discharge of the filtered water should be to a sanitary sewer system, or in its absence, to a septic tank and field system with adequate capacity. Filter material should be disposed of as friable ACM waste.

9.8 HAZARDOUS WASTE HAULERS/DUMPS

The APM should compile a list of hazardous waste haulers and disposal facilities from the local area to be pre-approved as authorized haulers/landfills. Interviews should be conducted and references checked to best determine whether a hauler/facility is professional, well-experienced, safety minded and knows/follows the applicable regulations.

Regardless of which disposal facility is chosen/used, once documented waste is sent and deposited at a landfill, the generator becomes potentially liable for a portion of the clean-up of that landfill (proportionate to the total amount contributed), should underlying soil or groundwater become contaminated. Years and perhaps decades usually pass before notifications are made to generators regarding their reimbursement obligations for clean-up costs.

10.0 CONTRACTOR OBSERVATION

The purpose of contractor observation is to monitor work in progress for compliance to the O&M Program and to be able to respond immediately to asbestos release situations.

When a potential for ACM disturbance exists because of the proximity of non-abatement work to the location of ACM, contractor observation is required. All work, with exceptions to projects approved by the APM, should be performed after hours when the HVAC fan units are shut-off. All ACMs within a work area will be identified by the APM. All work schedules and scopes of work will be reviewed by the APM to determine the possibility of disturbance. Jobsite meetings will be conducted to assure all parties are aware of the ACM locations and the procedures to follow should any ACM become disturbed during the work.

If there is a high possibility of disturbance then workers will wear full-face, dual-cartridge, respirators (or perhaps even Type C supplied air respirators) and disposable coveralls. Airborne fiber concentrations should be monitored for the duration of the project.

Before working in an area where ACMs are present and in close proximity, procedures will be outlined by the APM to minimize or eliminate disturbance. Procedures will be reviewed continually throughout the project.

All contractors providing services in the building shall be responsible for providing a training and education program for their employees which meets the applicable requirements of the Federal Hazard Communication Standard (29 CFR 1910.1200 or 29 CFR 1926.59) and/or the California
Hazard Communication Standard.

Contractors whose materials or work pose a health hazard to facility employees or occupants shall be responsible for providing material safety data sheets (MSDS) to the APM prior to using those materials.

Contractors who encounter suspected ACM during the course of their work and who must disturb, contact, or damage the suspected ACM must immediately stop work and contact the APM who will determine whether the material contains asbestos.

Contractors are responsible for ensuring that any subcontractors comply with all applicable requirements.

11.0 ASBESTOS AWARENESS TRAINING INFORMATION

When conducting a 2 hour asbestos awareness class for building occupants or for custodial workers, the information in Section 11.0 of this O&M Plan should be compressed into a handout with a listing of key topics that can be distributed to each employee for subsequent review after the class is concluded. The information included in this O&M Plan is more targeted at the instructor of the awareness class and would likely require more than 2 hours to teach, read and discuss.

11.1 KEY TOPICS FOR AWARENESS TRAINING

In order to protect the health and well-being of the occupants and staff at this building against any potential health risk from this carcinogen, a formal Operation and Maintenance (O&M) program has been established.

What is asbestos?
Asbestos is a known human carcinogen. The health effects of asbestos exposure include lung cancer, asbestosis, mesothelioma and other cancers.

Asbestos is the name applied to six naturally occurring minerals that are mined from the earth. The six different types of asbestos include amosite, chrysotile, tremolite, actinolite, anthophyllite and crocidolite. Of these six types, three are used more commonly. Chrysotile (white) is the most common, then amosite (brown/off-white) and finally crocidolite (blue).

Asbestos fibers are almost indestructible. They are resistant to chemicals and heat, and they are very stable in the environment. They do not evaporate into air or dissolve in water, and they are not broken down over time. Asbestos is probably the best insulator known to man. Because asbestos has so many useful properties, it has been used in over 3,000 different products.

Usually asbestos fibers are mixed with other materials to actually form the asbestos-containing products. Depending on what the product is, the amount of asbestos in asbestos in the material may vary.

Where is asbestos found?
Asbestos may be found in many different products and places. Some examples of products that might contain asbestos are:

Sprayed-on fire proofing and insulation in buildings
Thermal system insulation for pipes and boilers

Wall and ceiling insulation
Ceiling tiles
Floor tiles and adhesives/mastics
Putties, caulks, and cements
Roofing shingles
Siding shingles on old residential buildings
Wall and ceiling textures and decorative acoustic sprays
Joint compound
Brake linings and clutch pads

At VACCHS, asbestos is most likely to be found in:
Thermal system insulation around pipes in mechanical spaces, ceiling plenums and walls
Certain older types of floor tiles and the adhesive applied to the tile to stick them to the floor
Possibly inside interiors of fire doors

The building areas that have asbestos-containing materials in them will have notices posted near the main entrances.

When is it dangerous?
The most common way for asbestos fibers to enter the body is through inhalation. Asbestos containing material is not generally considered to be harmful unless it is releasing dust or fibers into the air where they can be inhaled or ingested. Many of the fibers will become trapped in the mucous membranes of the nose and throat where they can then be removed, but some may pass deep into the lungs, or, if swallowed, into the digestive tract. Once they are trapped in the body, the fibers can cause health problems.

Asbestos is most hazardous when it is **friable**. The term "friable" means that the asbestos is easily crumbled by hand, releasing fibers into the air. Thermal system insulation on piping is highly friable. Asbestos floor tile is not.

Non-friable asbestos-containing materials will not release asbestos fibers unless they are disturbed or damaged in some way. If a non-friable ACM is drilled, sanded or broken it may release fibers into the air. If it is left alone and not disturbed, it will not.

Damage and deterioration will increase the friability of asbestos-containing materials. Water damage, continual vibration, aging, and physical impact such as drilling, grinding, buffing, cutting, sawing, or striking can break the materials down making fiber release more likely.

The VACCHS has implemented an O&M Plan that includes continual re-inspection of the ACMs in Building 1 to ensure that any deterioration or damage is identified and is removed or controlled as necessary to prevent any airborne fiber releases.

What are the health affects?
Because it is so hard to destroy asbestos fibers, the body cannot break them down or remove them once they are lodged in lung or body tissues. They remain in place where they can cause disease. The three primary diseases associated with asbestos exposure are Asbestosis, Lung Cancer and Mesothelioma.

Asbestosis is a serious, chronic, non-cancerous respiratory disease. Inhaled asbestos fibers aggravate and cause scarring in lung tissues. Symptoms of asbestosis include shortness of breath and a dry crackling sound in the lungs while inhaling. In its advanced stages, the disease may cause cardiac failure. There is no effective treatment for asbestosis; the disease is usually disabling or fatal. The risk of asbestosis is minimal for those who do not work with asbestos; the disease is rarely caused by neighborhood or family exposure. Those who work with asbestos (like asbestos abatement worker, asbestos manufacturing plant workers, etc.) on a daily basis may be at significant risk, depending on the nature of the exposure and precautions taken.

Lung cancer causes the largest number of deaths related to asbestos exposure. The incidence of lung cancer in people who are directly involved in the mining, milling, manufacturing and use of asbestos and its products is much higher than in the general population. The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains, hoarseness, and anemia. People who are exposed to asbestos and are also exposed to some other carcinogen, such as cigarette smoke, have a significantly greater risk of developing lung cancer than people who have only been exposed to asbestos. Asbestos workers who smoke are about 90 times more likely to develop lung cancer than people who neither smoke nor have been exposed to asbestos.

Mesothelioma is a rare form of cancer that most often occurs in the thin membrane lining of the lungs, chest, abdomen, and (rarely) heart. Virtually all cases of mesothelioma are directly due to asbestos exposure. Workers in asbestos mines, asbestos mills and factories, and shipyards that use asbestos, as well as people who manufacture and install asbestos insulation, have an increased risk of mesothelioma. People who live with asbestos workers, near asbestos mining areas, near asbestos product factories or near shipyards where use of asbestos has produced large quantities of airborne asbestos fibers also have developed mesothelioma.

Other Cancers in the esophagus, larynx, oral cavity, stomach, colon and kidney may be caused by exposure to asbestos.

Three things seem to determine your likelihood of developing one of these asbestos related diseases: (1) the amount and duration of your exposure, (2) whether or not you smoke and (3) your age.

The amount and duration of your exposure - the more you are exposed to asbestos and the more fibers that enter your body, the more likely you are to develop asbestos related problems. While there is no conclusively "safe level" of asbestos exposure, people who are exposed more frequently over a long period of time are more at risk.

Whether or not you smoke - if you smoke and you have been exposed to asbestos, you are far more likely to develop lung cancer than someone who does not smoke and who has not been exposed to asbestos. If you work with asbestos or have been exposed to it, the first thing you should do to reduce your chances of developing cancer is to stop smoking.

Age - cases of mesothelioma have occurred in the children of asbestos workers whose only exposures were from the dust brought home on the clothing of family members who worked with asbestos. The younger people are when they inhale asbestos, the more likely they are to develop mesothelioma. This is why enormous efforts are being made to prevent school children from being exposed.

Because each exposure to asbestos increases the body burden of asbestos fibers, it is very important to reduce and minimize your exposure.

How can you avoid exposure to asbestos?
In order to avoid being exposed to asbestos, you must be aware of the locations it is likely to be found. If you do not know whether something is asbestos or not, assume that it is until it is verified otherwise. Remember that you cannot tell if a material contains asbestos just by looking at it.

The VACCHS has performed extensive sampling throughout Building 1 and has complete survey documentation for the suspect ACMs in the building. VACCHS has personnel that can take samples from materials in order to determine whether or not they contain asbestos. If you need to have materials analyzed or tested for asbestos, please contact the Asbestos Program Manager. Never try to take a sample yourself unless you are licensed to do so.

If you have reason to suspect that something is asbestos, either because it is labeled as such, or because it something that is likely to contain asbestos (9" floor tile, for example), do not disturb it at all. To best protect yourself and others in the building, do not drill, hammer, cut, saw, break, sand, damage, move or disturb any material that

could contain asbestos.

If you need to do work that might involve removing or disturbing asbestos, check with APM to find out if it can be done safely.

Janitors and custodians should never sand or dry buff asbestos containing floor tiles, and only wet stripping methods may be used during stripping operations. Low abrasion pads should be used at speeds below 300 rpm.

Broken and damaged asbestos floor tiles must also be removed by trained O&M workers or asbestos abatement workers. Report any suspect broken tiles to the APM.

It is important to report any damaged asbestos-containing materials to the APM immediately. If, for example, you discover some insulation material has been knocked off of a pipe, this would be considered a "spill." As such it would need to be cleaned up immediately by trained O&M workers or asbestos abatement workers. Do not attempt to clean up spills yourself. Disturb the material as little as possible. Take measures to prevent others from disturbing the spill until the APM provides a response crew.

By knowing where asbestos is likely to be located and then taking measures not to disturb it, you will protect yourself and others from exposure to this hazardous substance.

11.2 WHAT IS ASBESTOS?

Asbestos is the name given to a group of minerals that occur naturally as bundles of fibers which can be separated into thin threads. These fibers are not affected by heat or chemicals and do not conduct electricity. For these reasons, asbestos has been widely used in many industries. The word asbestos is derived from a similarly spelled Greek word that means inextinguishable. There are two main varieties of asbestos. The serpentine form which is characterized by long, soft, flexible and finely-polished strands, which may be woven into a cloth; chrysotile is the primary representative. The second variety is amphiboles, which occur as straight needle-like fibers of which crocidolite, amosite, anthophyllite, tremolite and actinolite are the primary examples.

11.3 HISTORY OF ASBESTOS

Asbestos has been used for more than 2,000 years. It was named by the Ancient Greeks, its name meaning "inextinguishable". The Greeks also noted its harmful biological effects. Even though the Greek geographer Strabo and the Roman naturalist Pliny the Elder both observed the "sickness of the lungs" in the slaves that wove asbestos into cloth, they were in such awe of asbestos' seemingly magical properties that they ignored

the symptoms.

The Greeks used asbestos for the wicks of the eternal flames of the vestal virgins, as the funeral dress for the cremation of kings, and as napkins. It is rumored that Romans would clean asbestos napkins by throwing them in the fire. The asbestos cloth would come out of the fire whiter than it went in, so the Romans named asbestos "amiantus", meaning "unpolluted".

Use of asbestos declined during the Middle Ages, yet some say that Charlemagne had asbestos tablecloths. Marco Polo was also shown items made from asbestos cloth on his travels.

Asbestos use was brought back in the 1700s, but did not become popular until the Industrial Revolution during the late 1800s. It then began to be used as insulation for steam pipes, turbines, boilers, kilns, ovens, and other high-temperature products. Ancient observations of the health risks of asbestos were either forgotten or ignored.

Asbestos was mined and used commercially in North America beginning in the late 1800s. Its use increased greatly during World War II. Since then, it has been used in many industries. For example, the building and construction industry has used it for strengthening cement and plastics as well as for insulation, fireproofing, and sound absorption. The shipbuilding industry has used asbestos to insulate boilers, steampipes, and hot water pipes. The automotive industry uses asbestos in vehicle brakeshoes and clutch pads. More than 5,000 products contain or have contained asbestos.

At the turn of the twentieth century (1900’s), researchers began to notice a large number of deaths and lung problems in asbestos mining towns. In 1917 and 1918, it was observed by several studies inEurpoe and the United States that asbestos workers were dying unnaturally young.

In 1924 the first worker’s compansation claim for illness due to asebstos exposure was filed against Johns Manville, major asbestos manufacturer in the United States.

The first diagnosis of asbestosis was made in 1924. A woman had been working with asbestos since she was thirteen at the Turner Brothers Asbestos Company in Great Britan. She died when she was thirty-three years old, and an English doctor determined that the cause of death was what he called "asbestosis". Because of this, a subsequent study was done on asbestos workers in England. Twenty-five percent of them showed evidence of asbestos-related lung disease. Laws were passed in 1931 to increase ventilation and to make asbestosis an excusable work-related disease. It would take the United States ten more years to make these steps.

In the 1930s major medical journals began to publish articles that linked asbestos to cancer. Various lawsuits were brought against asbestos product manufacturers by affected workers, and each was secretly settled by the companies and their insuran ce carriers so that cases would not become public knowledge. The re-discovery of asbestos-related diseases were put on the back burner for several years due to the emergence of silicosis (a lung disease caused by silica dust inhalation).

The asbestos manufacturers and their insurance carriers formed lobbying groups that were successful in preventing private lawsuits for asbestos exposure and preventing efforts on the part of the government to regulate asbestos exposure. The affected workers were limited to processing liability claims through workers compensation insurance. In 1958 the first product liability lawsuit was filed against Johns Manville by a worker of an insulation installing company (HW Porter). The lawsuit went to trial and just as the case was nearing a close, Mansville offered to settle the case with the stipulation that the monetary amount remain undisclosed and that the lawsuit information remain unpublished. In the 1960's other lawsuit cases were secretly settled with similar terms. This gave a clear warning to the asbestos industry and they began even more concerted efforts to hide the risks associated with asbestos exposure. The asbestos manufacturing industry was admitting their responsibility but doing so in a way that prevented it from becoming public knowledge.

Companies continued to use asbestos in manufacturing and construction. Despite that many materials, such as fiberglass insulation, were created to replace asbestos, companies that used asbestos ignored the safer alternatives. They ignored the danger for the sake of profits, much like the tobacco industry. The conduct of the asbestos manufacturers is especially egregious because the victims were largely exploited workers who were unaware of the serious health risks they were exposed to on a daily basis.

In the late 1970s, the U.S. Consumer Product Safety Commission (CPSC) banned the use of asbestos in wallboard patching compounds and gas fireplaces because the asbestos fibers in these products could be released into the environment during use. Additionally, asbestos was voluntarily withdrawn by manufacturers of electric hair dryers. In 1989, the U.S. Environmental Protection Agency (EPA) banned all new uses of asbestos; uses established prior to 1989 are still allowed. The EPA has established regulations that require school systems to inspect for damaged asbestos and to eliminate or reduce the exposure to occupants by removing the asbestos or encasing it. In June 2000, the CPSC concluded that the risk of children's exposure to asbestos fibers in crayons was extremely low. However, the U.S. manufacturers of these crayons agreed to reformulate their products within a year. In August 2000, the EPA recommended that consumers reduce possible asbestos exposure from vermiculite-containing garden products by limiting the amount of dust produced during use. The EPA suggested that consumers use

vermiculite outdoors or in a well-ventilated area; keep vermiculite damp while using it; avoid bringing dust from vermiculite use into the home on clothing; and use premixed potting soil, which is less likely to generate dust.

11.3 THE USES OF ASBESTOS

Prior to the mid 1970's, the United States used over 5 million tons of asbestos yearly. Most was used for fireproofing and insulation materials, especially in the construction industry where it was incorporated into cements, tiles, felts and garments. In the textile industry, uses are fire-proof draperies used on theater curtains and asbestos sheets. Plasterers applied and asbestos mix on steel foundations in order to prevent the steel from buckling in case of fire. Until around 1974 over three million tons of ACM fire-proofing mixture was used annually. The practice of spraying asbestos-containing insulation in buildings was banned by the EPA in the 1970's.

By 1982, the United States used less than ½ million tons of asbestos, a significant decrease from the 1974 level of 5 million tons.

Asbestos products resist heat and withstand abrasive forces. Chrysotile makes up 50% of the brake-lining material used in vehicle brakes; workers are exposed to asbestos in while repairing or replacing brake linings. Other asbestos products of this type are used on railroad cars, airplanes, and industrial machinery. The ship-building industry has been a major user of asbestos because the substance is good for insulation boilers, steam pipes, hot water pipes, nuclear reactors in ships both in initial fitting and in repairs and re-fittings. Various sealants and patching tape compounds contain asbestos, and both floor and ceiling insulating tiles in the past also used asbestos.

A large number of workers are exposed to asbestos. Somewhere between 11 and 18 million U.S. workmen have been exposed to asbestos dusts during their lifetime in the past 40 years, including approximately 4.5 million shipyard workers, 300,000 textile workers, 100,000 insulation workers, and perhaps another 3 to 5 million workers who handle asbestos at some point during its manufacture. It is apparent that individuals exposed includes those who mine the asbestos, those who work in the mills in which asbestos is crushed, and those who manufacture the asbestos products -- all are/were at risk in varying degrees. Carpenters are exposed when they cut asbestos board, or when they work in the presence of insulators or other workers working with the asbestos products. Facility workers are at risk when servicing systems with asbestos piping or other insulation materials. Any worker aboard ship or working in shipyards is similarly exposed to asbestos dust, and indeed even families of workers who work in the vicinity of a shipyard or mine are at similar risk.

Families of workers who bring home asbestos dust on their clothes are at risk. The demolition of old buildings containing asbestos exposes workers and the general public.

It has been demonstrated that a period of time as short as one month's exposure to asbestos dust results in a significant risk to the individual from asbestos-associated diseases. Some health professionals still hold tight the their "one fiber" theory of asbestos disease; that all it takes is the one fiber lodging in the lungs at the wrong place at the wrong time for disease to develop.

11.4 DISEASES AND THE DISEASE PROCESS

The size of the different types of asbestos fibers is the most important aspects in explaining which disease is contracted. Crocidolite fibers are the tiniest and most needle-like of all, and can penetrate deep into the tissues lining the lung order to produce cancer. It is also interesting that more cases are produced in those workers who are the furthest along the line in manufacturing or processing asbestos – those who deal with the final products. The fewest cases of mesothelioma occur in the workers with the heaviest ore exposure. This implies that processing breaks down the asbestos into finer particles which have a better ability to penetrate deep into the tissues of the lungs. Mesothelioma is more often found in industries which use crocidolite and amosite asbestos, such as in the shipyard workers.

It has been shown that the aerodynamic behavior of asbestos particles is related to the diameter of the fiber. Fibers larger than 5 microns in diameter are trapped primarily in the nose and throat and the larger air tubes leading into the lungs. These larger fibers and particles are removed through sneezing, nose blowing and the natural cilia action of the body's bronchial system. Fibers between 1 and 5 microns in diameter are capable of descending into the lower portions of the bronchi into the small channels of the lung used for air distribution. Only fibers less than 1 micron in diameter are capable of entering the air spaces called alveoli, where they may more readily penetrate the outer lung tissue. It is also apparent with asbestosis, that gravity may play a part in the deposition of asbestos particles, as lung scarring is more prominent in the lower lung field. Once the asbestos fibers enter lung tissue approximately 25% of them become coated or walled off by macrophages, the scavengers of the lung, which try to isolate foreign particles to prevent tissue injury. At least 75% of the smaller fibers are not similarly walled off and remain uncoated. It is theorized that the physical characteristics of each asbestos fiber plays a distinct part in the type of disease produced.

Once the asbestos fiber has penetrated the lung tissue, local irritation at that point causes the lung to produce cellular membranes which is part of the healing process. Over a long period of time, some of the asbestos fibers are surrounded by macrophages which try to protect the lung tissue from foreign bodies. The macrophages leech out or

extract the magnesium from the asbestos which in turn reduce the ability of the lung to produce and maintain these macrophages. Once this occurs the lungs become scarred from asbestos fiber penetration damage (these fibers act like thousands of needles). This is called fibrosis and reduces the capacity of the lung. It's affects are evidenced by shortness of breath and reduced lung capacity. It is probable that the degree of reaction is related to the number of fibers inhales into the lung as well as the individual's inherent biologic susceptibility or reactivity. It has been shown that both the total years of exposure coupled with the "dustiness" of the job account for cumulative dust exposure, and that these exposures are directly related to patient's symptoms, lung function tests, x-ray changes, the development of lung cancer, as well as mortality statistics. It has been found that mesothelioma needs much less exposure to the asbestos dust than the other diseases associated with asbestos..

There are six general areas of human disease caused by or at leased strongly associated with exposure to asbestos dust. Most important and most common is asbestosis, or scarred lung tissue. Before adequate control of asbestos dust in the air was instituted approximately 20% of asbestos miners developed asbestosis. With better precautions used in the handling of asbestos during more recent years, it is already noted that perhaps up to only 10% of the miners become afflicted with asbestosis. This is a significant decrease but it seems that 10% is still an unaccepatable amount. There is also a dormancy period before asbestos related diseases appear. For instance, one study followed a group of asbestos insulation workers via chest xrays over the passage of time. Chest x-rays were 10% abnormal within ten years of initial exposure, 44% abnormal within 20 years of initial exposure, 87% abnormal within 40 years of initial exposure, and practically 94% of all chest x-rays of people exposed over 40 years have show lung problem.

There is a dormancy or latency period of approximately 20 years after first exposure before symptoms of asbestos related disease become noticable. The asbestos worker may indeed have worked only one to three years in asbestos dust, and yet, 15-20 years later, asbestosis of the lung is apparent. Scarring in the lung progresses during those 20 years even after first exposure to asbestos dust has stopped.

During an asbestos worker's lifetime, pulmonary function studies show that lung capacity decreases, noticed by a shortness of breath as time continues. The use of the chest x-ray and the pulmonary function evaluations recommended for all people involved in asbestos removal. This offers the earliest means of detecting asbestos related disease. Although we do not know what the actual fiber level is that causes human disease, workers are living longer, and having less disability due to asbestos related diseases because of stringent precautions.

The second most common type of disease related to asbestos exposure is pleural plaques, plaques building up on the lining that protects the lung. These are sores, or a damaged areas, on the chest lining. These plaques occur most commonly in workers exposed to anthophyllite type asbestos fibers. The plaque is picked up often on routine chest x-ray as an ill-defined module along the margin of the lung. Chest x-rays are also an integral part of the physical required by anyone involved in asbestos work. These plaques rarely cause symptoms and if a plaque is found on a chest x-ray, one can anticipate that individuals with the plaque will probably have already developed lung cancer.

The malignant mesothelioma of the pleura is found only in people exposed to asbestos. It is now well known that malignant mesothelioma can be induced by asbestos dust inhalation in as short a period of time as one or two months. Mesothelioma usually develops in the lung lining and spreads around and into the lung or abdominal cavity with death generally occurs within one year after identification. With mesothelioma a person suffers from weight loss, lack of ambition, chest or shoulder pain, abdominal swelling or obstruction of the intestine, with generally rapid progression of the disease. Adequate treatment is not yet available. The amount of asbestos fibers needed to produce mesothelioma is apparently much less than that necessary to produce asbestosis or pulmonary fibrosis.

Lung cancer is a confirmed disease cause by asbestos exposure. During the past ten years 15 to 20% of people having significant asbestos exposure died of lung cancer. The worker's likelihood of developing lung cancer is slightly greater in the worker that has pleural plaques noted on chest x-rays. Lung cancer can be more effectively treated than mesothelioma. The longer the duration of the asbestos-exposed workers employment, the greater the risk in developing lung cancer. Even one month of working with asbestos is enough to increase the instance of lung cancer twice as much as in another worker with no asbestos exposure.

11.5 RELATIONSHIP OF SMOKING TO ASBESTOS

Many studies have shown that the combination of smoking and asbestos exposure is particularly hazardous. Smokers who are also exposed to asbestos have a greatly increased risk of lung cancer. However, smoking combined with asbestos exposure does not appear to increase the risk of mesothelioma. There is evidence that quitting smoking will reduce the risk of lung cancer among asbestos-exposed workers. People who were exposed to asbestos on the job at any time during their life or who suspect they may have been exposed should not smoke. If they smoke, they should stop.

In August 1978, Johns-Manville, the biggest producer of asbestos products in the United States, not only had banned smoking entirely in the company work area, but has since

established a policy that no person who smokes will be hired by the company for any operation where there is a possibility of exposure to asbestos.

For workers with asbestosis, smoking aggravates and causes a significantly greater obstructive defect in the lungs. The effects further increases the worker's shortness of breath, and decreases his/her amount of cough and expectoration, as compared with the non-smoking worker who develops asbestosis.

Statistics show that the non-smoking asbestos worker will develop lung cancer approximately 5 times more commonly than the non-smoking, non-asbestos workers. In the smoking asbestos worker, however, there is a 54 times greater rate of lung cancer in comparison to the non-smoking, non-asbestos-exposed individual.

Asbestos workers chance of developing lung cancer is 20 times greater if he smokes than if he does not smoke.

11.6 TYPES OF ASBESTOS IN BUILDINGS

Chrysotile makes up approximately 70% of the world production of asbestos and is mined primarily in Quebec, Canada, which produces 95% of the world production of chrysotile. Chrysotile is also produced in Vermont, the Union of South Africa, Russia and to a lesser extent, in certain parts of Europe. All types of asbestos have the outstanding characteristics of being almost indestructible on exposure to body fluids, highly resistant to heat and extremely resistant to acid erosion. Chrysotile is especially resistant to heat, being able to withstand 500 degrees centigrade. It is less resistant to acid erosion and in bodily tissues; for example, the magnesium gradually tends to be leached out over many years.

Crocidolite is blue asbestos and produced primarily in the Cape of South Africa. The cape of South Africa makes up approximately 3.5% of the world production of asbestos. It is more acid resistant than chrysotile and is used often in marine insulation and aboard ship. It is also resistant to heat, but to a lesser extent than chrysotile, being able to withstand 200 degrees Centigrade. Its needle-like morphology enables it to penetrate further and deeper into body tissues than the other types of asbestos.

Amosite is produced largely in Transvaal, South Africa, primarily since 1907. It has somewhat coarser brownish fibers which have the outstanding characteristic of being acid-resistant and is used in marine insulation and other aspects of shop building. It was also widely used in pipe and boiler lagging in buildings.

Anthophyllite is mined predominantly in Finland. It is the coarsest of the asbestos silicates, heat resistant only to 200 degrees Centigrade and has an inherent tensile

strengths much less than crocidolite. It is not flexible and is used primarily in the chemical industry. Anthophyllite makes up less than 1% of world usage of asbestos. It is rarely found in building insulation.

Two other little-used types of asbestos are tremolite and actinolite. Tremolite is a more brittle asbestos, has a fairly good heat resistance, and it, as well as actinolite make up each less than 1% of world asbestos production. Actinolite is rarely used, although it is very acid and heat resistant.

Asbestos-containing material (ACM) found in buildings could include:

SURFACING MATERIAL - ACM sprayed or troweled onto surfaces such as acoustical plaster found on ceilings and walls, and fire-proofing material on structural members,

THERMAL SYSTEM INSULATION - ACM applied to pipes, boilers, tanks, ducts, etc., to prevent heat loss or gain or water condensation, and

MISCELLANEOUS MATERIAL - other ACM such as floor tile, mastic, wallboard, siding, and transite materials.

The materials in the first two categories are of particular concern since they tend to be friable, i.e., can be reduced to a powder by hand pressure. Friable materials are more likely to release fibers when disturbed. However, non-friable materials may release fibers if ground, cut, sanded, or otherwise manipulated. The O&M Plan is intended to be flexible in that every situation on campus cannot be foreseen in advance. Methods of response may change from time to time while others may be added. New procedures will be developed as experience and job requirements expand.

11.7 EMPLOYEE PROTECTION

Nearly everyone is exposed to asbestos at some time during their life. However, most people do not become ill from their exposure. People who become ill from asbestos are usually those who are exposed to it on a regular basis, most often in a job where they work directly with the material or through substantial environmental contact.

Although it is known that the risk to workers increases with heavier exposure and longer exposure time, investigators have found asbestos-related diseases in individuals with only brief exposures. Generally, those who develop asbestos-related diseases show no signs of illness for a long time after their first exposure. It can take from 10 to 40 years for symptoms of an asbestos-related condition to appear.

There is some evidence that family members of workers heavily exposed to asbestos face an increased risk of developing mesothelioma. This risk is thought to result from exposure to asbestos fibers brought into the home on the shoes, clothing, skin, and hair of workers. This type of exposure is called paraoccupational exposure. To decrease these exposures, people exposed to asbestos at work are required to shower and change their clothing before leaving the workplace.

Not all workers exposed to asbestos will develop diseases related to their exposure. The risk of developing asbestos-related diseases varies with the type of industry in which the exposure occurred and with the extent of the exposure. Asbestos that is bonded into finished products such as walls and tiles poses no risk to health as long as it is not damaged or disturbed (for example, by sawing or drilling) in such a way as to release fibers into the air. When asbestos fibers are set free and inhaled, however, exposed individuals are at risk of developing an asbestos-related disease. In addition, different types of asbestos fibers may be associated with different health risks. For example, results of several studies suggest that amphibole forms of asbestos may be more harmful than chrysotile, particularly for mesothelioma. Even so, no fiber type can be considered harmless, and people working with asbestos should always take proper safety precautions to limit exposure.

Individuals who have been exposed (or suspect they have been exposed) to asbestos fibers on the job or at home via a family contact should inform their physician of their exposure history and any symptoms. Asbestos fibers can be measured in urine, feces, mucus, or material rinsed out of the lungs. A thorough physical examination, including a chest x-ray and lung function tests, may be recommended. It is important to note that chest x-rays cannot detect asbestos fibers in the lungs, but they can help identify any lung changes resulting from asbestos exposure. Interpretation of the chest x-ray may require the help of a specialist who is experienced in reading x-rays for asbestos-related diseases. Other tests also may be necessary. As noted earlier, the symptoms of asbestos-related diseases may not become apparent for many decades after exposure. If any of the following symptoms develop, a physical examination should be scheduled without delay:

- Shortness of breath;
- A cough or a change in cough pattern;
- Blood in the sputum (fluid) coughed up from the lungs;
- Pain in the chest or abdomen;
- Difficulty in swallowing or prolonged hoarseness; and/or
- Significant weight loss.

O&M Workers and other employees will be protected from exposure to asbestos in many ways. Employers are required to follow OSHA regulations dealing with asbestos

exposure on the job. Workers should use all protective equipment provided by their employers and follow recommended work practices and safety procedures. Protection will take the form of approved work practices, training, respiratory protection, decontamination procedures, etc. to name a few.

11.8 LABELS AND SIGNAGE

ACMs located in maintenance areas will be labeled with caution labels. Such caution labels will be printed in letters of sufficient size and contrast as to be readily visible and legible. Each maintenance room or area will have a minimum of one label and as many additional labels as may be necessary to ensure ready visibility and legibility.

The absence of a label does not ensure that the material does not contain asbestos. Any material that might be removed, penetrated, damaged or otherwise distributed by repair, remodeling, renovation, maintenance or other activity must either be analyzed or assumed/presumed to be ACM.

For facilities with ACM present in general work areas, a notice will be posted informing employees of the presence of asbestos in the work place. Notice will read, at a minimum:

Notice To Employees - This facility has been inspected for the presence of asbestos containing material (ACM). ACM is present in this facility. Exposure to ACM may cause health problems. For more information contact the APM. A notification form has been included in the appendix section and as a MS Word document for modification if necessary.

11.9 MEDICAL EXAMINATION FOR O&M PERSONNEL

All O&M Supervisors and Workers will have a physical exam within 30 days of employment and within 30 days before or after termination, as specified by OSHA regulations. The physician shall be made aware of the physical requirements of asbestos control, removal and clean-up work so that he/she can more accurately determine the employee’s ability to safely perform such work. The examining physician or clinic should be aware that employees will be exposed to asbestos and will be required to wear respirators and work under hot and adverse conditions.

OSHA requires the following: chest roentgenogram, posterior or anterior, 14" x 17", medical history to elicit symptomology of respiratory disease and pulmonary function testing to include both forced vital capacity (FVC) and forced expiratory volume at one second (FEV 1.0).

Physician should be advised that all examination results shall be made available, for inspection and copying, to the Assistant Secretary of Labor for OSHA, to the Director of National Institute for Occupational Safety and Health (NIOSH), to other authorized physicians and medical consultants of either of them, upon the request of the examined employee or former employee to his physician and the employer.

Medical records will be maintained by the physician and employer for a minimum of 30 years from the date of cessation of potential exposure to airborne concentrations of asbestos fiber or 30 years from date of termination of employee, whichever is the later.

In addition there must be a training program for all O&M employees. Education/training is necessary to provide the employee with information about the risks associated with asbestos work, to teach the employees how to work with asbestos safely, to promoting compliance with the elements of the O&M Plan and with the applicable regulations, and to promote safe work practices.

11.10 TRAINING

After a worker passes the medical examination they qualify for asbestos training. No worker should be allowed to enter an asbestos work area without being advised of the hazards and trained in protective measures and safe job procedures. A comprehensive training program for maintenance workers should be provided based on the class of work they will be expected to perform. The training may require more than the required number of hours depending on the ability of the workers to comprehend the training material.

Asbestos is a substance that can't be seen, felt, heard, tasted, smelled or readily identified. After working with asbestos for a length of time with no ill effects, workers tend to lower their guard against this carcinogen. EXPOSURE TO ASBESTOS CAN KILL!

One purpose of employee training is to provide an overview of health/safety problems encountered during asbestos projects and provide information necessary to manage these problems.

O&M Maintenance Workers, O&M Supervisors and Custodians should receive documented training as described in this O&M Plan for the work they will perform.

11.11 BODY PROTECTION

Facility employees involved in asbestos activities must be protected against the possibility of work area contamination due to inadvertent ACM disturbance. One way to protect workers is by having them use personal protection devises (respirators, suits,

etc.) when working around asbestos. The facility will supply all necessary personal protection equipment for their employees. Respirators and respiratory protection are covered in Section 12.0 of this document.

The employer will provide and require use of special whole body clothing, including rubber or steel toe boots if necessary, for any employee exposed to airborne asbestos fibers during their work. The employer will provide gloves as part of whole body protection to employees exposed to asbestos. This is particularly important when metal lath, suspended ceiling grids, and other materials are being removed. Many puncture and cut wounds occur when removing metal lath or cutting duct work. Use care and have a good first aid kit available. Scrapers, package knives, wire cutters, chisels and other sorts of blades tools are frequently used. Users should always scrape and/or cut away from the body. Protective hard hats must be worn at all times by employees on a jobsite where there is a potential for falling objects, electric shock or burn. Employers should provide non-fogging face shields or goggles for operations involving potential eye injuries.

Employers should check with the surfactant supplier on irritant properties of the wetting agents used during asbestos abatement activities. A material safety data sheet (MSDS) should always be on hand for all products/materials and all workers using the products/materials should be familiar with any cautions or special considerations for their safe use.

11.12 MISCELLANEOUS

OSHA requires that a poster be permanently posted on the job site notifying workers of their rights under the act. This poster, commonly known as the "Job Safety and Health Poster," is available from OSHA offices. This poster should be maintained in an area where all employees have the opportunity to read it. It should be offered in as many languages as necessary to meet the needs of your employees. It is important for all employees to understand their rights to a safe workplace.

When an employer has 10 or more employees, he/she is required to maintain a record of injuries and illnesses that occur as a result of the employees work. Part of this requirement can be fulfilled by completing an accident report as required by Worker's Compensation insurance carriers. The Log and Summary of Occupational Illnesses and Injuries -- OSHA Log 300 is also required. These forms and a booklet entitled, "What Every Employer Needs to Know About OSHA Record keeping," is available from OSHA and provides information on these and other record keeping requirements.

All facility employees are to be trained regarding the hazardous chemicals that may be encountered in their worksite (1) within 30 days of employment, (2) whenever changes

in work practices occur, and (3) at least annually thereafter as part of the facility Hazard Communication Program.

12.0 RESPIRATORY PROTECTION

When qualified O&M Workers (meaning employees who passed the physical exam and completed required training) work with ACMs, they must use, at a minimum, a half face dual cartridge negative pressure respirator equipped with HEPA filters. During such activities (non-removal, maintenance or accidental disturbance conditions), airborne fiber counts should not exceed 0.1 f/cc. The protection factor on a half face respirator is sufficient to protect the wearer to a condition not exceeding 0.01 f/cc within the mask, given a maximum 0.1 f/cc airborne fiber count in the work area. Published industry documentation of personnel air sampling for non-abatement maintenance workers does not typically exceed 0.05 f/cc. This prior documentation has been used to determine the minimum respirator protection factor needed. Personnel monitoring will be performed for O&M Workers/Supervisors working with ACM to document their specific exposure levels, as required by OSHA.

Any work performed on a surfacing ACM must be evaluated on a job by job basis regarding the required respiratory protection.

All jobs that could produce unpredictable/unknown airborne asbestos fiber concentrations must be approached in the safest manner possible. On these projects, until worker air sampling documentation proves that fiber concentrations can be maintained consistently below 0.1 f/cc, supplied air Type “C” respiratory protection must be maintained. These projects will be performed by an asbestos abatement contractor.

Work areas with an airborne fiber concentration exceeding 0.1 f/cc are restricted to supplied air Type “C” respirators, and are off limits to all except certified abatement contractor personnel and certified asbestos consultants.

12.1 PURCHASE OF RESPIRATORY PROTECTION EQUIPMENT

Employers are required to furnish respiratory protection equipment for the employees. When purchasing respirator protection equipment, be sure to purchase equipment approved for asbestos. An approved respirator is one that has been tested and found to meet minimum performance standards by the National Institute for Occupational Safety and Health (NIOSH). OSHA requires that NIOSH approved respirators be used if they are available.

A NIOSH approved respirator contains an assigned identification number placed on each unit, e.g., TC-21C-101, a label identifying the type of hazard the respirator is approved to

protect against, and additional information on the label which indicates limitations and identifies the component parts approved for use with the basic unit.

12.2 MEDICAL ASPECTS OF RESPIRATORY PROTECTION EQUIPMENT USAGE

The use of any respirator imposes some physiological stress on the user. Air purifying respirators, for example, make breathing more difficult because the filter cartridge impedes the flow of air. The special exhalation valve on an open circuit pressure demand respirator requires the wearer to exhale against significant resistance. The bulk and weight of a self contained breathing apparatus can be a burden. If the wearer is using an airline respirator, he/she might have to drag up to 150 feet of hose around. All of the above factors can significantly increase the employee's workload. The wearer must have a medical examination to determine if he/she is physically able to wear respiratory protective equipment without aggravating a pre-existing medical problem.

While a medical examination by a physician is the preferred screening mechanism for respirator usage, the following checklist will give a good indication of the prospective user's ability to wear a respirator.

Lung:	History of asthma or emphysema
	Difficulty in breathing
	Previously documented lung problems
Heart:	High blood pressure
	Arterial diseases
	Documented heart problems
Other:	Missing or arthritic fingers
	Facial scars
	Claustrophobia
	Poor eyesight

A "yes" answer to any of the preceding questions would indicate that the person may not be capable of working while wearing a respirator. A medical opinion to confirm any of the above situations (answers "yes") should be obtained.

12.3 ISSUANCE OF RESPIRATORY PROTECTION EQUIPMENT

Where practical, the employee should be given respiratory protective equipment for his/her exclusive use. A journal can be established to keep track of all employees who are issued respiratory protection equipment. Each respirator permanently assigned to

an individual should be durably marked to indicate to whom it was assigned. This mark must not affect the fit or performance in any way.

12.4 RESPIRATORY PROTECTION EQUIPMENT FITTING

It is essential that respiratory protection equipment be properly fitted to the employee when it is issued and at least annually thereafter. All the care that went in the design and manufacture of a respirator to maximize protection will not effectively protect the wearer against the contaminant if the face piece does not fit the face of the wearer, or if there are improper wearing practices.

Assuming that there are several brands of a particular type of face piece available (the employer should provide several to choose from), which one fits best? This can be best determined by performance of a respirator fit test.

12.5 TYPES OF FIT TESTS

Qualitative fit test. Qualitative fits tests last between 10-15 minutes and are usually simple. This type involves the use of a chemical (irritant smoke, banana oil) to determine if the respirator fits well. The wearer is asked to recite aloud a specific passage from the OSHA regulations and while he/she is reading the passage the fit test operator uses a smoke tube to blow smoke around the seals and into the cartridges of the respirator. The wearer is required to wear the respirator for 10 minutes during the test. The respirator does not fit properly if the wearer detects the substance when reading the passage or at any other time during the test. Another respirator must be chosen and fit tested until the person passes the fit test. If the person does not find a respirator that fits, he/she may not perform maintenance work with asbestos-containing materials.

Quantitative fit test: The quantitative test is more accurate than the qualitative fit test. It requires the purchase of expensive equipment, a specially trained operator, and in most circumstances it is not used for the applications described in this O&M Plan.

Qualitative seal check: Another type of fit test that is performed every time a negative pressure respirator is put on (donned) is called a seal check. There are two parts to the seal check: the positive pressure check and the negative pressure check. These are used as a quick check to ensure the respirator is sealed to the face prior to entering the potentially hazardous atmosphere.

These fit tests apply only to the negative pressure air-purifying respirators. The APM should choose the best methods suited for the program and demonstrate and explain the methods to the employees.

12.6 FREQUENCY OF FIT TESTS

Qualitative fit tests should be repeated at appropriate intervals, particularly when there is a change in the wearer's physical status, such as weight gain/loss, growth of facial hair or change in face contours. Cal/OSHA requires fit testing once per year. The seal checks should be performed each time a respirator is put on for work, and as often as possible during the course of work to ensure that the respirator is properly positioned and provided the necessary protection.

12.7 SPECIAL PROBLEMS IN RESPIRATOR FITTING

Facial hair between the sealing surface of a respirator face piece and the wearer's skin will prevent a good seal. Beards, moustaches and sideburns can prevent satisfactory sealing. The sealing problem is especially critical when negative pressure air-purifying respirators are used. The negative pressure created in the face piece of these respirators during inhalation can lead to leakage of contaminant into the face piece when there is a poor seal. Cal/OSHA is now requiring that all certified asbestos personnel with facial hair sign a waiver when applying or recertifying indicating that they will shave their facial hair before entering a contained area.

Some air supplying respirators that use airlines can also lead to leakage at the sealing surface due to their mode of operation. Therefore, individuals who have visible stubble, a moustache, sideburns, or a beard that passes between the skin and the sealing surface of the face piece should not wear a respirator.

Corrective eyeglasses that have temple bars or straps should not be used when a full face piece respirator is worn because the bars or straps could pass through the face piece to face seal. Manufacturers of respiratory protective equipment can provide kits for installing eyeglasses in their respirator face pieces. Glasses or lenses must be mounted by a qualified individual to insure proper fitting.

As a general rule, contact lenses should not be worn in work areas that contain airborne contaminants. Contaminants in the atmosphere may get underneath the contact lens and can cause severe damage to the eyes.

12.8 STORAGE OF RESPIRATORS

All the care that goes into cleaning and maintenance of a respirator can be negated by improper storage. Respirators must be stored in a way that will protect it from dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals. Leaving a respirator unprotected can lead to damage of the working parts or permanent distortion of the face pieces, thus rendering it unusable.

After cleaning and disinfecting a respirator, it should be placed in a re-sealable plastic bag until the next use. It should be stored with the face piece and exhalation valve in a more or less normal position to prevent the rubber or plastic form taking a permanent distorted "set". Respirators should not be stored with anything else on top of it.

12.9 INSPECTION FOR DEFECTS

An important part of a respirator maintenance program is periodic inspection of the components. If performed carefully, inspections will identify damaged or malfunctioning parts.

12.10 INSPECTION SCHEDULES

All respirators must be inspected before and after each use and during cleaning.

Equipment designated for emergency use must be inspected after each use; during cleaning; and tested at least monthly.

12.11 RECORD KEEPING FOR RESPIRATORS

The APM must keep records of inspection dates and findings for respirators maintained for emergency use.

12.12 AIR-PURIFYING RESPIRATORS

Inspect the following:

Rubber face piece - check for:

Excessive dirt (clean all dirt from face piece);
Cracks, tears, or holes (replace with new face piece);
Distortion (allow face piece to "sit" - free from any constraints and see if distortion disappears; if not, replace with new face piece);
Cracked, scratched, or loose fitting lenses (contact respirator manufacturer to see if replacement is possible; otherwise, replace with new face piece).

Head straps - check for:

Breaks or tears (replace head straps);
Loss of elasticity (replace head straps);
Broken or malfunctioning buckles or attachments (replace with new buckles);

Excessively worn head harness which might allow the face piece to slip (replace head strap).

Inhalation valve, exhalation valve - check for:

Detergent residue, dust particles, or dirt on valve or valve seat (clean residue with soap and water);
Cracks, tears or distortion in the valve material or valve seat (contact manufacturer for instructions);
Missing or defective valve cover (obtain valve cover from manufacturer)

Filters - check for:

Proper filter for the expected hazard;
Approval designation;
Missing or worn gaskets (contact manufacturer for replacement);
Worn threads - both filter threads and face piece threads (replace filter or face piece, whichever is applicable);
Cracks or dents in filter housing (replace filter);
Deterioration of gas mask canister harness (replace harness);
Service life indicator or end of service date - for expiration, (contact manufacturer to find out if your filter element has one; if not, ask what will indicate the "end of service").

12.13 LOW AND HIGH TEMPERATURE

Use of respiratory protection equipment in low temperatures can create several problems. The lenses of the full face piece equipment may fog due to condensation of the water vapor in the exhaled breath. Coating the inner surface of the lens with an anti-fogging compound will reduce fogging. Nose cups that direct the warm, moist exhales air through the exhalation valve without touching the lens are available from the manufacturer for insertion into the full face piece. At low temperatures, the exhalation valve can freeze onto the valve seat due to the moisture in the exhaled air. The user will be aware when this situation occurs by the increased pressure in the face piece. When un-sticking the valve, care should be used to prevent tearing of the rubber diaphragm.

Respirator usage in hot environments can put additional stress on the user. The stress can be minimized by using a lightweight respirator with low breathing resistance. An airline type air-supplying respirator equipped with a vortex tube can be helpful. The vortex tube may either cool or warm the supplied air (depending on the connection and setting) so that this protection device can be used in both hot and cold environments.

13.0 GENERAL HEALTH AND SAFETY AWARENESS

Throughout this document references are made to specific OSHA regulations. Some references cite Federal OSHA standards. Some states (including California) have their own OSHA programs, which essentially implement the Federal OSHA requirements. Occasionally the state programs will institute additional requirements that are applicable to work only in that specific state. Cal/OSHA regulations for general and construction safety should be referenced with regards to general safety compliance programs to ensure that the information provided as a part of the this general health and safety awareness plan is in full compliance with state-specific standards. This document is an asbestos operations and maintenance plan with added asbestos awareness information and some limited health and safety information where applicable to asbestos O&M work.

Healthcare facilities include hospitals, clinics, dental offices, out-patient surgery centers, birthing centers, and nursing homes. Aside from potential exposure to ACMs, there are numerous “special” health and safety issues associated with healthcare facilities. They include bloodborne pathogens, other biological hazards, potential chemical and drug exposures, anesthetic gas exposures, respiratory hazards, ergonomic hazards from lifting and repetitive tasks, laser hazards, hazards associated with laboratories, and radioactive material and x-ray hazards to name only a few.

In addition to the medical staff, large healthcare facilities employ a wide variety of trades that have health and safety hazards associated with them. These include mechanical/electrical and HVAC system maintenance, medical equipment maintenance, housekeeping, food service, building and grounds maintenance, laundry, and administrative staff.

This information is targeted for general health and safety as it relates to asbestos control in Building 1 at VACCHS. Other health and safety related topics and more specific information should be covered by other facility training programs, as requried by OSHA.

13.1 HAZARD COMMUNICATION

In order to ensure chemical safety in the workplace, information must be available about the identities and hazards of the chemicals. OSHA's Hazard Communication Standard (HCS or HAZCOM) requires the development and dissemination of such information. Chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and prepare labels and material safety data sheets (MSDSs) to convey the hazard information to their downstream customers. All employers with hazardous chemicals in their workplaces must have labels and MSDSs

for their potentially exposed workers, and train them to handle the chemicals appropriately.

An effective HAZCOM program is largely dependent on the degree of management's involvement in and commitment to the program; inclusion of employees in safety and health decisions; rigorous worksite analysis to identify hazards and potential hazards; stringent prevention and control measures; and thorough training. A good HAZCOM program addresses hazards whether or not they are regulated by government standards. An effective HAZCOM program includes the following, at a minimum:

Labeling - All containers of hazardous chemicals must be labeled, tagged, or marked with the identity of the material and appropriate hazard warnings. This includes asbestos in areas where maintenance or service work would likely disturb the material and cause a potential airborne exposure.

Material Safety Data Sheets (MSDSs) - Chemical manufacturers and importers are required to obtain or develop an MSDS for each hazardous chemical they produce or import. Distributors are responsible for ensuring that their customers are provided a copy of these MSDSs. Employers must have an MSDS for each hazardous chemical they use. Asbestos does not have a specific MSDS.

Training - Each employee who may be exposed to hazardous chemicals when working must be provided information and trained prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes. This includes exposure to asbestos.

13.2 COMMON FIRST AID

OSHA requires that employees be given a safe and healthy workplace that is reasonably free of occupational hazards. It is unrealistic to expect accidents will not happen, regardless of how stringent the health and safety programs are or how dilligently they are followed. Employers are required to provide medical and first aid personnel and supplies commensurate with the hazards of the workplace. The details of a workplace medical and first aid program are dependent on the circumstances of each workplace and employer. The intent of this section is to provide general information that may be of assistance but it is not a complete medical/first aid manual.

First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires little technology or training to administer. Most often the persons rendering first aid are not trained or experienced in the health care practice. First aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn;

applying bandages and dressings; the use of non-prescription medicine; draining blisters; removing debris from the eyes; massage; and drinking fluids to relieve heat stress. OSHA's revised recordkeeping rule does not require first aid cases to be documented.

Get Medical Attention for All Injuries - It is very important for you to get immediate treatment for every injury, regardless how small you may think it is. A small unimportant injury, such as a splinter wound or a puncture wound, can quickly lead to an infection, threatening the health and limb of the employee. Even the smallest scratch is large enough for dangerous germs to enter, and in large bruises or deep cuts, germs come in by the millions. Immediate examination and treatment is necessary for every injury.

Control Bleeding with Pressure - Bleeding is the most visible result of an injury. Each adult has between five and six quarts of blood in their body. Most people can lose a small amount of blood with no problem, but if a quart or more is quickly lost, it could lead to shock and/or death. One of the best ways to treat bleeding is to place a clean cloth on the wound and apply pressure with the palm of your hand until the bleeding stops. You should also elevate the wound above the victim's heart, if possible, to slow down the bleeding at the wound site. Once the bleeding stops, do not try to remove the cloth that is against the open wound as it could disturb the blood clotting and restart the bleeding. If the bleeding is very serious, apply pressure to the nearest major pressure point, located either on the inside of the upper arm between the shoulder and elbow, or in the groin area where the leg joins the body. Direct pressure is better than a pressure point or a tourniquet because direct pressure stops blood circulation only at the wound. Only use the pressure points if elevation and direct pressure haven't controlled the bleeding. Never use a tourniquet (a device, such as a bandage twisted tight with a stick, to control the flow of blood) except in response to an extreme emergency, such as a severed arm or leg. Tourniquets can damage nerves and blood vessels and can cause the victim to lose an arm or leg.

Treat Physical Shock Quickly - Shock can threaten the life of the victim of an injury if it is not treated quickly. Even if the injury doesn't directly cause death, the victim can go into shock and die. Shock occurs when the body's important functions are threatened by not getting enough blood or when the major organs and tissues don't receive enough oxygen. Some of the symptoms of shock are a pale or bluish skin color that is cold to the touch, vomiting, dull and sunken eyes, and unusual thirst. Shock requires medical treatment to be reversed, so all you can do is prevent it from getting worse. Maintain an open airway for breathing, control any obvious bleeding and elevate the legs about 12 inches unless an injury makes it impossible. You can also prevent the loss of body heat by covering the victim (over and under) with blankets. Don't give the victim anything to eat or drink because this may cause vomiting. Generally, keep the victim lying flat on the

back. A victim who is unconscious or bleeding from the mouth should lie on one side so breathing is easier. Stay with the victim until medical help arrives.

Move the injured person only when absolutely necessary - Never move an injured person unless there is a fire or a threat of fire or explosions. The major concern with moving an injured person is making the injury worse, which is especially true with spinal cord injuries. If you must move an injured person, try to drag him or her by the clothing around the neck or shoulder area. If possible, drag the person onto a blanket or large cloth and then drag the blanket.

Perform the Heimlich Maneuver on Choking Victims - Ask the victim to cough, speak, or breathe. If the victim can do none of these things, stand behind the victim and locate the bottom rib with your hand. Move your hand across the abdomen to the area above the navel then make a fist and place your thumb side on the stomach. Place your other hand over your fist and press into the victim's stomach with a quick upward thrust until the food is dislodged.

Flush Burns Immediately with Water - There are a many different types of burns. They can be thermal burns, chemical burns, electrical burns or contact burns. Each of the burns can occur in a different way, but treatment for them is very similar. For thermal, chemical or contact burns, the first step is to run cold water over the burn for a minimum of 30 minutes. If the burn is small enough, keep it completely under water. Flushing the burn takes priority over calling for help. Flush the burn FIRST. If the victim's clothing is stuck to the burn, don't try to remove it. Remove clothing that is not stuck to the burn by cutting or tearing it. Cover the burn with a clean, cotton material. If you do not have clean, cotton material, do not cover the burn with anything. Do not scrub the burn and do not apply any soap, ointment, or home remedies. Also, don't offer the burn victim anything to drink or eat, but keep the victim covered with a blanket to maintain a normal body temperature until medical help arrives.

If the victim has received an electrical burn, the treatment is a little different. Don't touch a victim who has been in contact with electricity unless you are clear of the power source. If the victim is still in contact with the power source, electricity will travel through the victim's body and electrify you when you reach to touch. Once the victim is clear of the power source, your priority is to check for any airway obstruction, and to check breathing and circulation. Administer CPR if necessary. Once the victim is stable, begin to run cold water over the burns for a minimum of 30 minutes. Don't move the victim and don't scrub the burns or apply any soap, ointment, or home remedies. After flushing the burn, apply a clean, cotton cloth to the burn. If cotton is not available, don't use anything. Keep the victim warm and still and try to maintain a normal body temperature until medical help arrives.

Use Cool Treatment for Heat Exhaustion or Heat Stroke – Heat Stress, heat exhaustion and heat stroke are all different things. These are addressed in Section 13.9.

Respond Appropriately to Poisoning - The first thing to do is get the victim away from the poison. Then provide treatment appropriate to the form of the poisoning. If the poison is in solid form, such as pills, remove it from the victim's mouth using a clean cloth wrapped around your finger. Don't try this with infants because it could force the poison further down their throat. If the poison is a gas, you may need a respirator to protect yourself. After checking the area first for your safety, remove the victim from the area and take to fresh air. If the poison is corrosive to the skin, remove the clothing from the affected area and flush with water for 30 minutes. Take the poison container or label with you when you call for medical help because you will need to be able to answer questions about the poison. Try to stay calm and follow the instructions you are given. If the poison is in contact with the eyes, flush the victim's eyes for a minimum of 15 minutes with clean water.

Keep a First Aid Kit Checklist - In order to administer effective first aid, it is important to maintain adequate supplies in each first aid kit. First aid kits can be purchased commercially already stocked with the necessary supplies, or one can be made by including the following items:

Adhesive bandages: available in a large range of sizes for minor cuts, abrasions and puncture wounds

Butterfly closures: these hold wound edges firmly together.

Rolled gauze: these allow freedom of movement and are recommended for securing the dressing and/or pads. These are especially good for hard-to-bandage wounds.

Nonstick Sterile Pads: these are soft, super absorbent pads that provide a good environment for wound healing. These are recommended for bleeding and draining wounds, burns, infections.

First Aid Tapes: Various types of tapes should be included in each kit. These include adhesive, which is waterproof and extra strong for times when rigid strapping is needed; clear, which stretches with the body's movement, good for visible wounds; cloth, recommended for most first aid taping needs, including taping heavy dressings (less irritating than adhesive); and paper, which is recommended for sensitive skin and is used for light and frequently changed dressings.

Items that also can be included in each kit are tweezers, first aid cream, thermometer, an analgesic or equivalent, and an ice pack.

Report all injuries to your supervisor - As with getting medical attention for all injuries, it is equally important that you report all injuries to your supervisor. It is critical that the employer check into the causes of every job-related injury, regardless how minor, to find out exactly how it happened. There may be unsafe procedures or unsafe equipment that should be corrected.

13.3 THE NEED FOR PERSONAL PROTECTIVE EQUIPMENT

Hazards exist in every workplace in many different forms: sharp edges, falling objects, flying sparks, chemicals, noise and a myriad of other potentially dangerous situations. OSHA requires that employers protect their employees from workplace hazards that can cause injury.

Controlling a hazard at its source is the best way to protect employees. Depending on the hazard or workplace conditions, OSHA recommends the use of engineering or work practice controls to manage or eliminate hazards to the greatest extent possible. For example, building a barrier between the hazard and the employees is an engineering control; changing the way in which employees perform their work is a work practice control.

When engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment (PPE) to their employees and ensure its proper use. Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits.

The information, methods and procedures provided in this document are based on the Federal OSHA requirements for PPE as set forth in the Code of Federal Regulations (CFR) at 29 CFR 1910.132 (General requirements); 29 CFR 1910.133 (Eye and face protection); 29 CFR 1910.135 (Head protection); 29 CFR 1910.136 (Foot protection); 29 CFR 1910. 137 (Electrical protective equipment); 29 CFR 1910.138 (Hand protection); and regulations that cover the construction industry, at 29 CFR 1926.95 (Criteria for personal protective equipment); 29 CFR 1926.96 (Occupational foot protection); 29 CFR 1926.100 (Head protection); 29 CFR 1926.101 (Hearing protection); and 29 CFR 1926.102 (Eye and face protection); and for the maritime industry at 29 CFR 1915.152 (General requirements); 29 CFR 1915.153 (Eye and face protection); 29 CFR 1915.155 (Head protection); 29 CFR 1915.156 (Foot protection); and 29 CFR 1915.157 (Hand and body protection). These regulations should be reviewed and the necessary information distributed to achieve further compliance. California has similar regulations that should be reviewed for compliance assurance.

The information in this section does not address PPE requirements related to respiratory protection (29 CFR 1910.134). A separate written respiratory protection program should be implemented for O&M personnel who are required to wear a respirator to accomplish work duties.

PPE Requirements - To ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both employers and employees will help in establishing and maintaining a safe and healthful work environment. Employers are responsible for performing a "hazard assessment" of the workplace to identify and control physical and health hazards, identifying and providing appropriate PPE for employees, training employees in the use and care of the PPE, maintaining PPE, including replacing worn or damaged PPE and periodically reviewing, updating and evaluating the effectiveness of the PPE program.

Employees should properly wear PPE, attend training sessions on PPE, care for, clean and maintain PPE, and inform a supervisor of the need to repair or replace PPE. Specific requirements for PPE are presented in many different OSHA standards. Some standards require that employers provide PPE at no cost to the employee while others simply state that the employer must provide PPE.

Hazard Assessment - A first critical step in developing a comprehensive safety and health program is to identify physical and health hazards in the workplace. This process is known as a "hazard assessment." Potential hazards may be physical or health-related and a comprehensive hazard assessment should identify hazards in both categories. Examples of physical hazards include moving objects, fluctuating temperatures, high intensity lighting, rolling or pinching objects, electrical connections and sharp edges. Examples of health hazards include overexposure to harmful dusts (including asbestos), chemicals or radiation. Hazard assessment should begin with a walk-through survey of the building to develop a list of potential hazards in the following basic hazard categories: Impact, penetration, compression (roll-over), chemical, heat/cold, harmful dust, light (optical) radiation, and biologic. When the walk-through is complete, the employer should organize and analyze the data so that it may be efficiently used in determining the proper types of PPE required at the worksite. The employer should become aware of the different types of PPE available and the levels of protection offered. It is definitely a good idea to select PPE that will provide a level of protection greater than the minimum required to protect employees from hazards.

The workplace should be periodically reassessed for any changes in conditions, equipment or operating procedures that could affect occupational hazards. This periodic reassessment should also include a review of injury and illness records to spot any trends or areas of concern and taking appropriate corrective action. The suitability of

existing PPE, including an evaluation of its condition and age, should be included in the reassessment.

Documentation of the hazard assessment is required through a written certification that includes the following information: Identification of the workplace evaluated; name of the person conducting the assessment; date of the assessment; and identification of the document certifying completion of the hazard assessment.

Selecting PPE - All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. Employers should take the fit and comfort of PPE into consideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

OSHA requires that many categories of PPE meet or be equivalent to standards developed by the American National Standards Institute (ANSI). ANSI has been preparing safety standards since the 1920s, when the first safety standard was approved to protect the heads and eyes of industrial workers. Employersproviding PPE should make certain that any new equipment procured meets ANSI standards, if applicable. Existing PPE stocks must meet the ANSI standard in effect at the time of its manufacture or provide protection equivalent to PPE manufactured to the ANSI criteria.

Employers should inform employees who provide their own PPE of the employer's selection decisions and ensure that any employee-owned PPE used in the workplace conforms to the employer's criteria, based on the hazard assessment, OSHA requirements and ANSI standards. OSHA requires PPE to meet the following ANSI standards:

Eye and Face Protection: ANSI Z87.1-1989 (USA Standard for Occupational and Educational Eye and Face Protection).
Head Protection: ANSI Z89.1-1986.
Foot Protection: ANSI Z41.1-1991.
For hand protection, there is no ANSI standard for gloves but OSHA recommends that selection be based upon the tasks to be performed and the performance and construction characteristics of the glove material. For protection against chemicals, glove selection must be protective for the chemicals encountered.

Training Employees in the Proper Use of PPE - Employers are required to train each

employee who must use PPE. Employees must be trained to know at least when PPE is necessary, what PPE is necessary, how to properly put on, take off, adjust and wear the PPE, the limitations of the PPE and proper care, maintenance, useful life and disposal of PPE.

Employers should make sure that each employee demonstrates an understanding of the PPE training as well as the ability to properly wear and use PPE before they are allowed to perform work requiring the use of the PPE. If an employer believes that a previously trained employee is not demonstrating the proper understanding and skill level in the use of PPE, that employee should receive retraining. Other situations that require additional or retraining of employees include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

The employer must document the training of each employee required to wear or use PPE by preparing a certification containing the name of each employee trained, the date of training and a clear identification of the subject of the certification.

13.4 EYE AND FACE PROTECTION

Employees can be exposed to a large number of hazards that pose danger to their eyes and face. OSHA requires employers to ensure that employees have appropriate eye or face protection if they are exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially infected material or potentially harmful light radiation.

Many occupational eye injuries occur because workers are not wearing any eye protection while others result from wearing improper or poorly fitting eye protection. Employers must be sure that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard.

Prescription Lenses - Everyday use of prescription corrective lenses will not provide adequate protection against most occupational eye and face hazards. Employers must make sure that employees with corrective lenses either wear eye protection that incorporates the prescription into the design or wear additional eye protection over their prescription lenses. It is important to ensure that the protective eyewear does not disturb the proper positioning of the prescription lenses so that the employee's vision will not be inhibited or limited. Also, employees who wear contact lenses must wear eye or face PPE when working in hazardous conditions.

Eye Protection for Exposed Workers - OSHA suggests that eye protection be routinely considered for use by carpenters, electricians, machinists, mechanics, millwrights,

plumbers and pipefitters, sheetmetal workers and tinsmiths, assemblers, sanders, grinding machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. Employers of workers in other job categories should decide whether there is a need for eye and face PPE through a hazard assessment.

Potential eye or face injuries include dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering, the use of power tools or even strong wind forces. Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions are also potential concerns. Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes. Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles).

Types of Eye Protection - Selecting the most suitable eye and face protection for employees should take into consideration the ability to protect against specific workplace hazards, that they should fit properly and be reasonably comfortable to wear, that they should provide unrestricted vision and movement, that they should be durable and cleanable, that they should allow unrestricted functioning of any other required PPE.

The eye and face protection selected for employee use must clearly identify the manufacturer. Any new eye and face protective devices must comply with ANSI Z87.1-1989 or be at least as effective as this standard requires.

An employer may choose to provide one pair of protective eyewear for each position rather than individual eyewear for each employee. If this is done, the employer must make sure that employees disinfect shared protective eyewear after each use. Protective eyewear with corrective lenses may only be used by the employee for whom the corrective prescription was issued and may not be shared among employees.

Some of the most common types of eye and face protection include the following:

Safety spectacles. These protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side shields are available on some models.

Goggles. These are tight-fitting eye protection that completely cover the eyes, eye sockets and the facial area immediately surrounding the eyes and provide protection from impact, dust and splashes. Some goggles will fit over corrective lenses.

Welding shields. Constructed of vulcanized fiber or fiberglass and fitted with a filtered lens, welding shields protect eyes from burns caused by infrared or intense radiant light;

they also protect both the eyes and face from flying sparks, metal spatter and slag chips produced during welding, brazing, soldering and cutting operations. OSHA requires filter lenses to have a shade number appropriate to protect against the specific hazards of the work being performed in order to protect against harmful light radiation.

Laser safety goggles. These specialty goggles protect against intense concentrations of light produced by lasers. The type of laser safety goggles an employer chooses will depend upon the equipment and operating conditions in the workplace.

Face shields. These transparent sheets of plastic extend from the eyebrows to below the chin and across the entire width of the employee's head. Some are polarized for glare protection. Face shields protect against nuisance dusts and potential splashes or sprays of hazardous liquids but will not provide adequate protection against impact hazards. Face shields used in combination with goggles or safety spectacles will provide additional protection against impact hazards.

Each type of protective eyewear is designed to protect against specific hazards. Employers can identify the specific workplace hazards that threaten employees' eyes and faces by completing a hazard assessment as outlined in the earlier section.

This section will not provide information on eye protection for welding operations or for the use of lasers. These are specialized operations not routinely associated with asbestos work.

13.5 HEAD PROTECTION

Protecting employees from potential head injuries is a key element of any safety program. A head injury can impair an employee for life or it can be fatal. Wearing a safety helmet or hard hat is one of the easiest ways to protect an employee's head from injury. Hard hats can protect employees from impact and penetration hazards as well as from electrical shock and burn hazards.

Employers must ensure that their employees wear head protection if objects might fall from above and strike them on the head; they might bump their heads against fixed objects, such as exposed pipes or beams; or there is a possibility of accidental head contact with electrical hazards. Some examples of occupations in which employees should be required to wear head protection include construction workers, carpenters, electricians, linemen, plumbers and pipefitters, timber and log cutters, welders, among many others. Whenever there is a danger of objects falling from above, such as working below others who are using tools or working under a conveyor belt, head protection must be worn. Hard hats must be worn with the bill forward to protect employees properly.

In general, protective helmets or hard hats should resist penetration by objects, absorb the shock of a blow, be water-resistant and slow burning, and have clear instructions explaining proper adjustment and replacement of the suspension and headband. Hard hats must have a hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 1 to 1 1/4 inches (2.54 cm to 3.18 cm) away from the head. This type of design provides shock absorption during an impact and ventilation during normal wear.

Protective headgear must meet ANSI Standard Z89.1-1986 (Protective Headgear for Industrial Workers) or provide an equivalent level of protection. Helmets purchased before July 5, 1994 must comply with the earlier ANSI Standard (Z89.1-1969) or provide equivalent protection.

Types of Hard Hats - There are many types of hard hats available in the marketplace today. In addition to selecting protective headgear that meets ANSI standard requirements, employers should ensure that employees wear hard hats that provide appropriate protection against potential workplace hazards. It is important for employers to understand all potential hazards when making this selection, including electrical hazards. This can be done through a comprehensive hazard analysis and an awareness of the different types of protective headgear available.

Hard hats are divided into three industrial classes:

Class A hard hats provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts).

Class B hard hats provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/falling objects.

Class C hard hats provide lightweight comfort and impact protection but offer no protection from electrical hazards.

Another class of protective headgear on the market is called a “bump hat," designed for use in areas with low head clearance. They are recommended for areas where protection is needed from head bumps and lacerations. These are not designed to protect against falling or flying objects and are not ANSI approved. It is essential to check the type of hard hat employees are using to ensure that the equipment provides appropriate protection. Each hat should bear a label inside the shell that lists the manufacturer, the ANSI designation and the class of the hat.

Size and Care Considerations - Head protection that is either too large or too small is inappropriate for use, even if it meets all other requirements. Protective headgear must fit appropriately on the body and for the head size of each individual. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit (many adjust in 1/8-inch increments). A proper fit should allow sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat should not bind, slip, fall off or irritate the skin.

Some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields and mounted lights. Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.

Periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats. Never drill holes, paint or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

Hard hats with defects such as perforation, cracking, or deformity of the brim or shell or indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking) should be removed from service and replaced.

Always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

13.6 FOOT AND LEG PROTECTION

Employees who face possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials should wear protective footwear. Also, employees whose work involves exposure to hot substances or corrosive or poisonous materials must have protective gear to cover exposed body parts, including legs and feet. If an employee's feet may be exposed to electrical hazards, non-conductive footwear should

be worn. On the other hand, workplace exposure to static electricity may necessitate the use of conductive footwear.

Situations in which an employee should wear foot and/or leg protection include when heavy objects such as barrels or tools might roll onto or fall on the employee's feet; when working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes; exposure to molten metal that might splash on feet or legs; when working on or around hot, wet or slippery surfaces; and when working when electrical hazards are present.

Safety footwear must meet ANSI minimum compression and impact performance standards in ANSI Z41-1991 (American National Standard for Personal Protection-Protective Footwear) or provide equivalent protection. Footwear purchased before July 5, 1994, must meet or provide equivalent protection to the earlier ANSI Standard (ANSI Z41.1-1967). All ANSI approved footwear has a protective toe and offers impact and compression protection. But the type and amount of protection is not always the same. Different footwear protects in different ways. Check the product's labeling or consult the manufacturer to make sure the footwear will protect the user from the hazards they face.

Foot and leg protection choices include the following:

Leggings - protect the lower legs and feet from heat hazards such as molten metal or welding sparks.

Metatarsal guards - protect the instep area from impact and compression and are made of aluminum, steel, fiber or plastic, these guards may be strapped to the outside of shoes.

Toe guards - fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum or plastic.

Combination foot and shin guards - protect the lower legs and feet, and may be used in combination with toe guards when greater protection is needed.

Safety shoes have impact-resistant toes and heat-resistant soles that protect the feet against hot work surfaces common in roofing, paving and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres or nonconductive to protect workers from workplace electrical hazards.

Electrically conductive shoes provide protection against the buildup of static electricity. Employees working in explosive and hazardous locations such as explosives manufacturing facilities or grain elevators must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark and cause an explosion or fire. Foot powder should not be used in conjunction with protective conductive footwear because it provides insulation, reducing the conductive ability of the shoes. Silk, wool and nylon socks can produce static electricity and should not be worn with conductive footwear. Conductive shoes must be removed when the task requiring their use is completed. Note: Employees exposed to electrical hazards must never wear conductive shoes.

Electrical hazard, safety-toe shoes are nonconductive and will prevent the wearers' feet from completing an electrical circuit to the ground. These shoes can protect against open circuits of up to 600 volts in dry conditions and should be used in conjunction with other insulating equipment and additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy. The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive, grounded items. Note: Nonconductive footwear must not be used in explosive or hazardous locations.

Care of Protective Footwear - As with all protective equipment, safety footwear should be inspected prior to each use. Shoes and leggings should be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes, separation of materials, broken buckles or laces. The soles of shoes should be checked for pieces of metal or other embedded items that could present electrical or tripping hazards. Employees should follow the manufacturers' recommendations for cleaning and maintenance of protective footwear.

13.7 HAND AND ARM PROTECTION

If a workplace hazard assessment reveals that employees face potential injury to hands and arms that cannot be eliminated through engineering and work practice controls, employers must ensure that employees wear appropriate protection. Potential hazards include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures and amputations. Protective equipment includes gloves, finger guards and arm coverings or elbow-length gloves.

Employers should explore all possible engineering and work practice controls to eliminate hazards and use PPE to provide additional protection against hazards that cannot be completely eliminated through other means. For example, machine guards may eliminate a hazard. Installing a barrier to prevent workers from placing their hands

at the point of contact between a table saw blade and the item being cut is another method.

Types of Protective Gloves - There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging. It is essential that employees use gloves specifically designed for the hazards and tasks found in their workplace because gloves designed for one function may not protect against a different function even though they may appear to be an appropriate protective device.

The following are examples of some factors that may influence the selection of protective gloves for a workplace: Type of chemicals handled, nature of contact (total immersion, splash, etc.), Duration of contact, area requiring protection (hand only, forearm, arm), grip requirements (dry, wet, oily), thermal protection, sSize and comfort, and abrasion/resistance requirements.

Gloves made from a wide variety of materials are designed for many types of workplace hazards. In general, gloves fall into four groups: gloves made of leather, canvas or metal mesh; fabric and coated fabric gloves; chemical- and liquid-resistant gloves; and insulating rubber gloves.

Leather, Canvas or Metal Mesh Gloves - Sturdy gloves made from metal mesh, leather or canvas provide protection against cuts and burns. Leather or canvass gloves also protect against sustained heat.

Leather gloves protect against sparks, moderate heat, blows, chips and rough objects.

Aluminized gloves provide reflective and insulating protection against heat and require an insert made of synthetic materials to protect against heat and cold.

Aramid fiber gloves protect against heat and cold, are cut - and abrasive - resistant and wear well.

Synthetic gloves of various materials offer protection against heat and cold, are cut - and abrasive - resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.

Fabric and coated fabric gloves are made of cotton or other fabric to provide varying degrees of protection. Fabric gloves protect against dirt, slivers, chafing and abrasions. They do not provide sufficient protection for use with rough, sharp or heavy materials. Adding a plastic coating will strengthen some fabric gloves.

Coated fabric gloves are normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities. These gloves are used for tasks ranging from handling bricks and wire to chemical laboratory containers. When selecting gloves to protect against chemical exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions.

Chemical - and Liquid - Resistant Gloves
Chemical-resistant gloves are made with different kinds of rubber: natural, butyl, neoprene, nitrile and fluorocarbon (viton); or various kinds of plastic: polyvinyl chloride (PVC), polyvinyl alcohol and polyethylene. These materials can be blended or laminated for better performance. As a general rule, the thicker the glove material, the greater the chemical resistance but thick gloves may impair grip and dexterity, having a negative impact on safety.

Butyl gloves are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulfuric acid, hydrofluoric acid and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones, esters and nitrocompounds. Butyl gloves also resist oxidation, ozone corrosion and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.

Natural (latex) rubber gloves are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity and temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect workers' hands from most water solutions of acids, alkalis, salts and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners and powderless gloves are possible alternatives for workers who are allergic to latex gloves.

Neoprene gloves are made of synthetic rubber and offer good pliability, finger dexterity, high density and tear resistance. They protect against hydraulic fluids, gasoline, alcohols, organic acids and alkalis. They generally have chemical and wear resistance properties superior to those made of natural rubber.

Nitrile gloves are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics and alcohols but are generally not

recommended for use with strong oxidizing agents, aromatic solvents, ketones and acetates.

Care of Protective Gloves - Protective gloves should be inspected before each use to ensure that they are not torn, punctured or made ineffective in any way. A visual inspection will help detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks. Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure.

Any gloves with impaired protective ability should be discarded and replaced. Reuse of chemical-resistant gloves should be evaluated carefully, taking into consideration the absorptive qualities of the gloves. A decision to reuse chemically-exposed gloves should take into consideration the toxicity of the chemicals involved and factors such as duration of exposure, storage and temperature.

13.8 BODY PROTECTION

Employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practice or administrative controls, must wear appropriate body protection while performing their jobs. In addition to cuts and radiation, the following are examples of workplace hazards that could cause bodily injury: temperature extremes; hot splashes from molten metals and other hot liquids; potential impacts from tools, machinery and materials; and hazardous chemicals.

There are many varieties of protective clothing available for specific hazards. Employers are required to ensure that their employees wear personal protective equipment only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns and full body suits.

If a hazard assessment indicates a need for full body protection against toxic substances or harmful physical agents, the clothing should be carefully inspected before each use, it must fit each worker properly and it must function properly and for the purpose for which it is intended.

Protective clothing comes in a variety of materials, each effective against particular hazards, such as:

Paper-like fiber used for disposable suits provide protection against dust and splashes. These are the suits likely to be used on asbestos projects.

Treated wool and cotton adapts well to changing temperatures, is comfortable, and fire-resistant and protects against dust, abrasions and rough and irritating surfaces.

Duck is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp or rough materials.

Leather is often used to protect against dry heat and flames.

Rubber, rubberized fabrics, neoprene and plastics protect against certain chemicals and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to ensure that the material selected will provide protection against the specific hazard.

13.9 HEAT STRESS

Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. Many workers spend some part of their working day in a hot environment. Employees performing asbestos O&M work can experience heat stress when performing work in an enclosed area with limited ventillation and around heated machinery and when using full body suits and wearing respirators.

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. However, even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury. It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

A good heat stress training program should include knowledge of the hazards of heat stress, recognition of predisposing factors, danger signs, and symptoms, awareness of first-aid procedures for, and the potential health effects of, heat stroke, employee responsibilities in avoiding heat stress, dangers of using drugs, including therapeutic ones, and alcohol in hot work environments, use of protective clothing and equipment and the purpose and coverage of environmental and medical surveillance programs.

Heat Stroke - occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical

emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Heat Exhaustion - The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

Heat Cramps - are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (±0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a

loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Collapse ("Fainting") - In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

Heat Rashes - are the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Fatigue - A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

Heat Stress Control - Ventilation, air cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker. However, for this approach to be successful, the metabolic effort required for the worker to use or operate these devices must be less than the effort required without them. Another method is to reduce the effort necessary to operate power assists. The worker should be allowed to take frequent rest breaks in a cooler environment. The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

Fluid Replacement - Cool (50°-60°F) water or any cool liquid (except alcoholic beverages) should be made available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this

is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

Engineering Controls - These include general ventilation (used to dilute hot air with cooler air), air treatment/air cooling (differs from ventilation because it reduces the temperature of the air by removing heat from the air), air conditioning (air cooling), local air cooling (reducing air temperature in specific areas), heat conduction (insulating the hot surface that generates the heat).

Another way to reduce heat stress is to increase the air flow or convection using fans, etc. in the work area (as long as the air temperature is less than the worker's skin temperature). Changes in air speed can help workers stay cooler by increasing both the convective heat exchange (the exchange between the skin surface and the surrounding air) and the rate of evaporation. Because this method does not actually cool the air, any increases in air speed must impact the worker directly to be effective.

Worker Monitoring Programs - Every worker who works in extraordinary conditions that increase the risk of heat stress should be personally monitored. These conditions include wearing semipermeable or impermeable clothing when the temperature exceeds 21°C (69.8°F). Personal monitoring can be done by checking the heart rate, oral temperature, or extent of body water loss. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period. Oral temperature can be checked with a clinical thermometer after work but before the employee drinks water. If the oral temperature taken under the tongue exceeds 37.6°C, shorten the next work cycle by one third. Body water loss can be measured by weighing the worker on a scale at the beginning and end of each work day. The worker's weight loss should not exceed 1.5% of total body weight in a work day. If a weight loss exceeding this amount is observed, fluid intake should increase.

The other administrative controls can be used to reduce heat stress include reduce the physical demands of work (excessive lifting or digging with heavy objects); provide recovery areas (air-conditioned enclosures and rooms); use shifts (early morning, cool part of the day, or night work); use intermittent rest periods with water breaks; use relief workers; use worker pacing; and assign extra workers and limit worker occupancy, or the number of workers present, especially in confined or enclosed spaces.

Other aspects of heat stress programs can be obtained from various OSHA websites.

13.10 NOISE

Every year, over 30 million US workers are occupationally exposed to hazardous noise. Fortunately, the incidence of noise-induced hearing loss can be reduced or eliminated through the successful application of engineering controls and hearing conservation programs. Although noise-induced hearing loss is one of the most common occupational illnesses, it is often ignored because there are no visible effects, it usually develops over a long period of time, and, except in very rare cases, there is no pain. What does occur is a progressive loss of communication, socialization, and responsiveness to the environment.

Noise is not a new hazard. It has been a constant threat since the industrial revolution. Too much noise exposure may cause a temporary change in hearing (your ears may feel stuffed up) or a temporary ringing in your ears (tinnitus). These short-term problems usually go away within a few minutes or hours after leaving the noise. However, repeated exposures to loud noise can lead to permanent, incurable hearing loss or tinnitus. NIOSH recommends removing hazardous noise from the workplace whenever possible and using hearing protectors in those situations where dangerous noise exposures have not yet been controlled or eliminated.

Expandable foam plugs - These plugs are made of a formable material designed to expand and conform to the shape of each person's ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or across your palm doesn't matter. What's critical is the final result—a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially women with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small size expandable plug.

Pre-molded, reusable plugs - Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either “one-size-fits-most” or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. In dirty or dusty environments, you don't need to handle or roll the tips.

Canal caps - Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck or under the chin. Newer models have jointed bands increasing the ability to properly seal the earplug. The main advantage canal caps offer is convenience. When it's quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that adequately block all types of noise. Generally, the canal caps tips that resemble stand-alone earplugs seem to block the most noise.

Earmuffs - Earmuffs come in many models designed to fit most people. They work to block out noise by completely covering the outer ear. Muffs can be "low profile" with small ear cups or large to hold extra materials for use in extreme noise. Some muffs also include electronic components to help users communicate or to block impulsive noises. Workers who have heavy beards or sideburns or who wear glasses may find it difficult to get good protection from earmuffs. The hair and the temples of the glasses break the seal that the earmuff cushions make around the ear. For these workers, earplugs are best. Other potential drawbacks of earmuffs are that some people feel they can be hot and heavy in some environments.

Miscellaneous devices - Manufacturers are receptive to comments from hearing protection users. This has led to the development of new devices that are hybrids of the traditional types of hearing protectors. Because many people like the comfort of foam plugs, but don't want to roll them in dirty environments, a plug is now available that is essentially a foam tip on a stem. You insert this plug much like a pre-molded plug without rolling the foam. Scientists are developing earmuffs using high-tech materials to reduce weight and bulk, but still effectively block noise. On the horizon may be earplugs with built in two-way communication capability.

Still, the best hearing protector is the one that is comfortable and convenient and that you will wear every time you are in an environment with hazardous noise.

Hearing Protection - Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including: the loudness of the noise as measured in decibels (dB), the duration of each employee's exposure to the noise, whether employees move between work

areas with different noise levels, whether noise is generated from one or multiple sources.

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. For instance, employees may be exposed to a noise level of 90 dB for 8 hours per day (unless they experience a Standard Threshold Shift) before hearing protection is required. On the other hand, if the noise level reaches 115 dB hearing protection is required if the anticipated exposure exceeds 15 minutes.

13.11 MATERIAL HANDLING

Part of performing O&M work involves material handling - lifting and manually moving materials, equipment, etc. Manual material handling tasks may expose workers to physical risk factors. If these tasks are performed repeatedly or over long periods of time, they can lead to fatigue and injury. If handling practices are poorly executed, injuries will develop. The main risk factors, or conditions, associated with the development of injuries in manual material handling tasks include: Awkward postures (e.g., bending, twisting); repetitive motions (e.g., frequent reaching, lifting, carrying); forceful exertions (e.g., carrying or lifting heavy loads); pressure points (e.g., grasping [or contact from] loads, leaning against parts or surfaces that are hard or have sharp edges); static postures (e.g., maintaining fi xed positions for a long time); repeated or continual exposure to one or more of these factors initially may lead to fatigue and discomfort.

Over time, injury to the back, shoulders, hands, wrists, or other parts of the body may occur. Injuries may include damage to muscles, tendons, ligaments, nerves, and blood vessels. Injuries of this type are known as musculoskeletal disorders, or MSDs. In addition, poor environmental conditions, such as extreme heat, cold, noise, and poor lighting, may increase workers' chances of developing other types of problems.

Types of Ergonomic Improvements - In general, ergonomic improvements are changes made to improve the fit between the demands of work tasks and the capabilities of the workers. There are usually many options for improving a particular manual handling task. The APM or supervisor will make informed choices about which improvements will work best for particular tasks. There are two types of ergonomic improvements: Engineering improvements and administrative improvements.

Engineering improvements - These include rearranging, modifying, redesigning, providing or replacing tools, equipment, workstations, packaging, parts, processes, products, or materials. Observe how different workers perform the same tasks to get ideas for improving work practices or organizing the work. Then consider the following improvements: Alternate heavy tasks with light tasks; provide variety in jobs to eliminate or reduce repetition (i.e., overuse of the same muscle groups). Adjust work

schedules, work pace, or work practices; provide recovery time (e.g., short rest breaks). Modify work practices so that workers perform work within their power zone (i.e., above the knees, below the shoulders, and close to the body); rotate workers through jobs that use different muscles, body parts, or postures.

Administrative improvements, such as job rotation, can help reduce workers' exposures to risk factors by limiting the amount of time workers spend on "problem jobs." However, these measures may still expose workers to risk factors that can lead to injuries. For these reasons, the most effective way to eliminate "problem jobs" is to change them. This can be done by putting into place the appropriate engineering improvements and modifying work practices accordingly.

Training - Training alone is not an ergonomic improvement. Instead, it should be used together with any workplace changes made. Workers need training and hands-on practice with new tools, equipment, or work practices to make sure they have the skills necessary to work safely. Training is most effective when it is interactive and fully involves workers. Below are some suggestions for training based on adult learning principles: Provide hands-on practice when new tools, equipment, or procedures are introduced to the workforce; use several types of visual aids (e.g., pictures, charts, videos) of actual tasks in your workplace; hold small-group discussions and problem-solving sessions; and give workers ample opportunity for questions.

The goal is to reduce reaching and bending; reduce the stress on the back and shoulders; and reduce the effort and force needed to perform work tasks.

Guidelines for Safer Lifting - The use of stretching before performing work is appropriate as part of a comprehensive ergonomic program. Stretching must not be used in place of engineering and/or administrative improvements. Before lifting, always test the load for stability and weight. For loads that are unstable and/or heavy, follow management guidelines for equipment use, for reducing the weight of the load and for repacking containers to increase stability. Plan the lift by wearing appropriate shoes to avoid slips, trips, or falls. If you wear gloves, choose the size that fits properly. Depending on the material the gloves are made of and the number of pairs worn at once, more force may be needed to grasp and hold objects. For example, wearing a pair of heat-resistant gloves can reduce your grip strength up to 40 percent. Wearing two or more pairs of gloves at once can reduce your grip strength up to 60 percent. Lift only as much as you can safely handle by yourself. Keep the lifts in your power zone (i.e., above the knees, below the shoulders, and close to the body), if possible. Use extra caution when lifting loads that may be unstable. When lifting get a secure grip. Use both hands whenever possible. Avoid jerking by using smooth, even motions. Keep the load as close to the body as possible. To the extent feasible use your legs to push up and lift the load, not the upper body or back. Do not twist your body. Step to one side or the other to turn.

Alternate heavy lifting or forceful exertion tasks with less physically demanding tasks. Take rest breaks.

Guidelines for Safer Carrying - The use of stretching before performing work is appropriate as part of a comprehensive ergonomic program. Stretching must not be used in place of engineering and/or administrative improvements. Prepare for lifting the load by using the guidelines for lifting. Avoid carrying large or bulky loads that limit or obstruct your vision. Slide, push, or roll instead of carrying when appropriate. When there is a choice, push instead of pull. Carry only as much as you can safely handle by yourself. Try to avoid slopes, stairs, or other obstacles that make carrying materials more diffi cult. Beware of and try to avoid slippery fl oors (e.g., liquids, ice, oil, and fi ne powders). Use extra caution when moving loads that may be unstable. When carrying keep loads close to your body. Make sure you have a clear view of the path. When carrying containers with one hand, alternate hands. Whenever appropriate, use two hands to carry containers. Alternate heavy or forceful exertion tasks with less physically demanding tasks. Take rest breaks.

Guidelines for Equipment Use - Know your load and buy equipment of appropriate capacity. Remember, lighter-weight equipment is easier to move. Choose equipment appropriate for the material(s) being handled, the layout and design of your workplace, and the work tasks being performed.

Consider using powered equipment - rather than non-powered - when pushing and pulling forces are excessive. If available, select equipment with vertical handles so workers' hands can be in their power zone. Choose wheeled equipment which minimizes start forces (inertia) and reduces rolling resistance.

The amount of force required to move loads with wheeled equipment depends on a number of factors including the: weight and shape of the load, type and condition of the floor surface (e.g., smoothness, density, and other factors), route taken (e.g., slopes, obstacles, and other factors), type of wheels (i.e., the materials they are made of), size of wheels (larger wheels a minimum of 6 inches in diameter move more easily over holes, bumps, and fl oor irregularities), maintenance of wheels; and it is important to clean, lubricate, and/or replace wheels on a regular basis.

Ground All Electrically Operated Equipment - Make sure equipment alarms and warning devices are audible and working properly; inspect and maintain equipment according to manufacturers' recommendations; and follow all manufacturers' recommendations for proper equipment use.

Work Environment - Clear the aisles and doorways for safe passage and maneuvering of equipment; set barriers that prevent employees from coming close to or beneath

supported or moving loads; in tight spaces, use equipment with four swivel casters or wheels; and loads are easier to turn and control.

Work Practices - Train employees on proper equipment use and appropriate work practices. Push and pull equipment with the entire body instead of with just the arms and shoulders; when pushing or pulling use both hands when feasible; to move heavy loads over long distances, either reduce the load or use powered equipment and inspect pallets before loading or moving them.

Other methods such as the use of drum dollies, cart or platform truck, portable scissor lift, hand trucks, hand pallet truck, conveyor, portable hoist or crane, stacker, etc. will help keep employees free from injuries related to manual lifting/handling of materials necessary to perform their work.

13.12 LOCKOUT/TAGOUT – EQUIPMENT & ELECTRICAL SAFETY

"Lockout/Tagout (LOTO)" refers to specific practices and procedures to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of hazardous energy during service or maintenance activities. This requires that a designated individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance and that the authorized employee(s) either lock or tag the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively.

It is very important that all asbestos-related work be performed using a LOTO program.

13.13 FIRE SAFETY

Fire safety becomes everyone's responsibility at a jobsite, especially at asbestos work location. Employers should train workers about fire hazards in the workplace and about what to do in a fire emergency. A fire safty plan should outline the assignments of key personnel in the event of a fire and provide an evacuation plan for workers on the site. In the construction industry, a "fire plan" should be set up prior to beginning any demolition job.

Workers should be trained on how to escape from their work areas safely. If workers are expected to use firefighting equipment, they should be familiar with and trained to use the equipment safely. Every workplace must have enough exits suitably located to enable everyone to get out of the building quickly. Considerations include the type of structure, the number of persons exposed, the fire protection available, the type of industry involved, and the height and type of construction of the building or structure. In

addition, fire doors must not be blocked or locked when employees are inside. Delayed opening of fire doors, however, is permitted when an approved alarm system is integrated into the fire door design. Exit routes from buildings must be free of obstructions and properly marked with exit signs.

Employers do not have to provide portable fire extinguishers, but if they are provided, the employer must establish an educational program to familiarize workers with the general principles of fire extinguisher use. If workers are expected to use portable fire extinguishers, the employer must provide hands-on training in using this equipment.

Some employers are required to have an emergency action plan. When required, employers must develop emergency action plans that describe the routes for workers to use and procedures to follow; account for all evacuated employees; remain available for employee review; include procedures for evacuating disabled employees, address evacuation of employees who stay behind to shut down critical plant equipment, include preferred means of alerting employees to a fire emergency; provide for an employee alarm system throughout the workplace; require an alarm system that includes voice communication or sound signals such as bells, whistles, or horns; make the evacuation signal known to employees; ensure emergency training; and require employer review of the plan with new employees and with all employees whenever the plan is changed.

Some OSHA standards that require fire prevention plans be implemented. When required, employers must implement plans to minimize the frequency of evacuations. All fire prevention plans must be available for employee review; include housekeeping procedures for storage and cleanup of flammable materials and flammable waste; address handling and packaging of flammable waste; cover procedures for controlling workplace ignition sources such as smoking, welding, and burning; provide for proper cleaning and maintenance of heat producing equipment such as burners, heat exchangers, boilers, ovens, stoves, and fryers and require storage of flammables away from this equipment; inform workers of the potential fire hazardsof their jobs and plan procedures; require plan review with all new employees and with all employees whenever the plan is changed.

Fixed extinguishing systems throughout the workplace are among the most reliable fire fighting tools. These systems detect fires, sound an alarm, and send water to the fire and heat. To meet OSHA standards employers who have these systems must substitute (temporarily) a fire watch of trained employees to respond to fire emergencies when a fire suppression system is out of service; ensure that the watch is included in the fire prevention plan and the emergency action plan; and post signs for systems that use chemical agents (e.g., carbon dioxide, Halon 1211, etc.) posing a serious health hazard.

13.14 FALL PROTECTION

Working on and around stairways and ladders is hazardous. Stairways and ladders are major sources of injuries and fatalities among US workers, and many of the injuries are serious enough to require time off the job. OSHA rules apply to all stairways and ladders used in construction, alteration, repair, painting, decorating and demolition of worksites covered by the OSHA construction safety and health standards.

Additional fall protection devices such as safety harnesses and lanyards will only be used by trained asbestos abatement personnel and therefore are not discussed in this document.

When there is a break in elevation of 19 inches (48 cm) or more and no ramp, runway, embankment or personnel hoist is available, employers must provide a stairway or ladder at all worker points of access. When there is only one point of access between levels, employers must keep the access clear of obstacles to permit free passage by workers. If free passage becomes restricted, employers must provide a second point of access and ensure that workers use it. When there are more than two points of access between levels, employers must ensure that at least one point of access remains clear.

Employers must ensure that their worksite meets all requirements of the stairway and ladder rules before employees use stairways or ladders. This does not apply to ladders specifically manufactured for scaffold access and egress, but does apply to job-made and manufactured portable ladders intended for general purpose use.

The following rules apply to all ladders:
Maintain ladders free of oil, grease and other slipping hazards; do not load ladders beyond their maximum intended load nor beyond their manufacturer's rated capacity; use ladders only for their designed purpose; use ladders only on stable and level surfaces unless secured to prevent accidental movement; do not use ladders on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement; do not use slip-resistant feet as a substitute for exercising care when placing, lashing or holding a ladder upon slippery surfaces; secure ladders placed in areas such as passageways, doorways or driveways, or where they can be displaced by workplace activities or traffic to prevent accidental movement; do not use a barricade to keep traffic or activity away from the ladder; keep areas clear around the top and bottom of ladders; do not move, shift or extend ladders while in use; use ladders equipped with nonconductive side rails if the worker or the ladder could contact exposed energized electrical equipment; face the ladder when moving up or down; use at least one hand to grasp the ladder when climbing; and do not carry objects or loads that could cause loss of balance and falling.

Do not use *single-rail* ladders. Use *non-self-supporting ladders* (extension ladder) at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder. In addition, the top of a non-self-supporting ladder must be placed with two rails supported equally unless it is equipped with a single support attachment.

Do not use the top or top step of a stepladder as a step; do not use cross bracing on the rear section of stepladders for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections; and the metal spreader or locking devices must be provided on stepladders to hold the front and back sections in an open position when ladders are being used.

The minimum clear distance between side rails for all portable ladders must be 11.5 inches (29 cm). In addition, the rungs and steps of portable metal ladders must be corrugated, knurled, dimpled, coated with skid-resistant material or treated to minimize slipping. Non-self-supporting and self-supporting portable ladders are weight rated and must support at least four times the maximum intended load. When portable ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet above the upper landing surface. When such an extension is not possible, the ladder must be secured and a grasping device such as a grab rail must be provided to assist workers in mounting and dismounting the ladder. A ladder extension must not deflect under a load that would cause the ladder to slip off its supports.

Fixed ladders are not discussed as their use is not common to asbestos O&M work. If fixed ladders will be part of any O&M work activity, consult the proper regulation to ensure compliance.

Portable ladders with structural defects (such as broken or missing rungs, cleats or steps, broken or split rails, corroded components or other faulty or defective components) must immediately be marked defective or tagged with "Do Not Use" or similar language and withdrawn from service until repaired. Ladder repairs must restore the ladder to a condition meeting its original design criteria before the ladder is returned to use.

Employers must train all employees to recognize hazards related to ladders and stairways, and instruct them to minimize these hazards. Employers must retrain each employee as necessary to maintain their understanding and knowledge on the safe use and construction of ladders and stairs.

13.15 HAND AND POWER TOOLS

The employer is responsible for the safe condition of tools and equipment used by

employees. Employers shall not issue or permit the use of unsafe hand tools. Employees should be trained in the proper use and handling of tools and equipment.

Hand tools are tools that are powered manually. Hand tools include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

When using saw blades, knives, or other tools, users should direct the tools away from aisle areas and away from other employees working in close proximity. Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones. Cracked saw blades must be removed from service.

Wrenches must not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads. The wooden handles of tools must not be splintered.

Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

Power Tools require appropriate personal protective equipment such as safety goggles and gloves to be worn to protect against hazards. Workplace floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools. Power tools must be fitted with guards and safety switches; they are extremely hazardous when used improperly. The types of power tools are determined by their power source: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

To prevent hazards associated with the use of power tools, workers should observe the following general precautions: Never carry a tool by the cord or hose; never yank the cord or the hose to disconnect it from the receptacle; keep cords and hoses away from heat, oil, and sharp edges; disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters; keep all people not involved with the work at a safe distance from the work area; secure work with clamps or a vise, freeing both hands to operate the tool; avoid accidental starting; do not hold fingers on the switch button while carrying a plugged-in tool.

Maintain tools with care; keep them sharp and clean for best performance; follow instructions in the user's manual for lubricating and changing accessories; be sure to keep good footing and maintain good balance when operating power tools; wear proper apparel for the task (loose clothing, ties, or jewelry can become caught in moving parts); remove all damaged portable electric tools from use and tag them: "Do Not Use."

The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded. Machine guards, as appropriate, must be provided to protect the operator and others from the following: Point of operation; in-running nip points; rotating parts; flying chips and sparks. Safety guards must never be removed when a tool is being used.

Most hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released. Some hand-held power tools must be equipped with either a positive "on-off" control switch, a constant pressure switch, or a "lock-on" control. Other hand-held power tools such as circular saws, chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

Employees using electric tools must be aware of several dangers. Among the most serious hazards are electrical burns and shocks. Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electric-powered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death. An electric shock also can cause the user to fall off a ladder or other elevated work surface and be injured due to the fall. To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.

Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

The following general practices should be followed when using electric tools: Operate electric tools within their design limitations; use gloves and appropriate PPE when using electric tools; store electric tools in a dry place when not in use; do not use electric tools in damp or wet locations unless they are approved for that purpose; keep work areas well lighted when operating electric tools; ensure that cords from electric tools do not present a tripping hazard.

Employees who use electric tools must be protected by ground-fault circuit interrupters (GFCI) or an assured equipment-grounding conductor program.

Portable abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments. Abrasive wheel tools must be equipped with guards that: (1) cover the spindle end, nut, and flange projections; (2) maintain proper alignment with the wheel; and (3) do not exceed the strength of the fastenings. When using a powered grinder always use eye or face protection; turn off the power when not in use and never clamp a hand-held grinder in a vise.

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. There are several dangers associated with the use of pneumatic tools. The danger of getting hit by one of the tool's attachments or by some kind of fastener is the main risk. Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected. The same precautions should be taken with an air hose that are recommended for electric cords, because the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards. When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation. Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools. Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills. Compressed air guns should never be pointed toward anyone. Workers should never "dead-end" them against themselves or anyone else. A chip guard must be used when compressed air is used for cleaning.

Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold. Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield also should be used.

Noise is another hazard associated with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

Fuel-powered tools are usually operated with gasoline. The most serious hazard associated with the use of fuel-powered tools comes from fuel vapors that can burn or explode and also give off dangerous exhaust fumes. The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids. Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors. When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide. Fire extinguishers should also be available in the area.

Hydraulic Power Tools - The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type. The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

All jacks including lever and ratchet jacks, screw jacks, and hydraulic jacks must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded. A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip. To set up a jack, make certain of the following: The base of the jack rests on a firm, level surface; the jack is correctly centered; the jack head bears against a level surface; and the lift force is applied evenly. Proper maintenance of jacks is essential for safety. All jacks must be lubricated and inspected regularly.

13.16 CONFINED SPACES

Many workplaces contain spaces that are considered "confined" because their configurations hinder the activities of employees who must enter, work in, and exit them. A confined space has limited or restricted means for entry or exit, and it is not designed for continuous employee occupancy.

Confined spaces may be encountered in virtually any occupation; therefore, their recognition is the first step in preventing fatalities. Since deaths in confined spaces often occur because the atmosphere is oxygen-deficient, toxic or combustible, confined spaces that contain or have the potential to contain a serious atmospheric hazard should be classified as Permit-required confined spaces and should be tested prior to entry and continually monitored.

The terms "permit-required confined space" and "permit space" refer to spaces that meet OSHA's definition of a "confined space" and contain health or safety hazards. For this reason, OSHA requires workers to have a permit to enter these spaces. Throughout this publication, the term "permit space" will be used to describe a "permit-required confined space."

By definition, a confined space (any confined space):
(1) Is large enough for an employee to enter fully and perform assigned work;

(2) Is not designed for continuous occupancy by the employee; and
(3) Has a limited or restricted means of entry or exit.
These spaces may include underground vaults, tanks, storage bins, pits and diked areas, vessels, silos and other similar areas.

By definition, a permit-required confined space has one or more of these characteristics:
(1) Contains or has the potential to contain a hazardous atmosphere;
(2) Contains a material with the potential to engulf someone who enters the space;
(3) Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or
(4) Contains any other recognized serious safety or health hazards.

OSHA's Confined Space Standard contains the requirements for practices and procedures to protect employees in general industry from the hazards of entering permit spaces. Employers in general industry must evaluate their workplaces to determine if spaces are permit spaces. If a workplace contains permit spaces, the employer must inform exposed employees of their existence, location and the hazards they pose. This can be done by posting danger signs such as "DANGER -- PERMIT-REQUIRED CONFINED SPACE -- AUTHORIZED ENTRANTS ONLY" or using an equally effective means.

If employees are not to enter or work in confined spaces, employers must take effective measures to prevent them from entering these spaces. If employees are expected to enter permit spaces, the employer must develop a written confined space permit program and make it available to employees or their representatives.

Alternative to a full permit entry - Under certain conditions described in the standard, the employer may use alternate procedures for worker entry into a permit space. For example, if an employer can demonstrate with monitoring and inspection data that the only hazard is an actual or potential hazardous atmosphere that can be made safe for entry using continuous forced air ventilation, the employer may be exempted from some requirements, such as permits and attendants. However, even in these circumstances, the employer must test the internal atmosphere of the space for oxygen content, flammable gases and vapors, and the potential for toxic air contaminants before any employee enters it. The employer must also provide continuous ventilation and verify that the required measurements are performed before entry.

Written Programs - Any employer who allows employee entry into a permit space must develop and implement a written program for the space. Among other things, the OSHA standard requires the employer's written program to: Implement necessary measures to prevent unauthorized entry; identify and evaluate permit space hazards before allowing

employee entry; test atmospheric conditions in the permit space before entry operations and monitor the space during entry; perform appropriate testing for the following atmospheric hazards in this sequence: oxygen, combustible gases or vapors, and toxic gases or vapors; establish and implement the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations; identify employee job duties; provide and maintain, at no cost to the employee, personal protective equipment and any other equipment necessary for safe entry and require employees to use it; ensure that at least one attendant is stationed outside the permit space for the duration of entry operations; coordinate entry operations when employees of more than one employer are working in the permit space; implement appropriate procedures for summoning rescue and emergency services, and preventing unauthorized personnel from attempting rescue; establish, in writing, and implement a system for the preparation, issue, use and cancellation of entry permits; review established entry operations annually and revise the permit space entry program as necessary; and implement the procedures that any attendant who is required to monitor multiple spaces will follow during an emergency in one or more of those spaces.

Controlling Hazards - The employer's written program should establish the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations.

Equipment for Safe Entry - In addition to personal protective equipment, other equipment that employees may require for safe entry into a permit space includes testing, monitoring, ventilating, communications and lighting equipment; barriers and shields; ladders; and retrieval devices.

Detection of Hazardous Conditions - If hazardous conditions are detected during entry, employees must immediately leave the space. The employer must evaluate the space to determine the cause of the hazardous atmosphere and modify the program as necessary.

A space with no potential to have atmospheric hazards may be classified as a non-permit confined space only when all hazards are eliminated in accordance with the standard. If entry is required to eliminate hazards and obtain data, the employer must follow specific procedures outlined in the OSHA standard.

Informing Contract Employees - Employers must inform any contractors whom they hire to enter permit spaces about: The permit spaces and permit space entry requirements; any identified hazards; the employer's experience with the space, such as knowledge of hazardous conditions; and precautions or procedures to be followed when in or near permit spaces.

When employees of more than one employer are conducting entry operations, the affected employers must coordinate entry operations to ensure that affected employees are appropriately protected from permit space hazards. The employer also must give contractors any other pertinent information regarding hazards and operations in permit spaces and be debriefed at the conclusion of entry operations.

Entry Permits - A permit, signed by the entry supervisor, must be posted at all entrances or otherwise made available to entrants before they enter a permit space. The permit must verify that pre-entry preparations outlined in the standard have been completed. The duration of entry permits must not exceed the time required to complete an assignment. Entry permits must include name of permit space to be entered, authorized entrants, eligible attendants and individuals authorized to be entry supervisors; test results; tester's initials or signature; name and signature of supervisor who authorizes entry; purpose of entry and known space hazards; measures to be taken to isolate permit spaces and to eliminate or control space hazards; name and telephone numbers of rescue and emergency services and means to be used to contact them; date and authorized duration of entry; acceptable entry conditions; communication procedures and equipment to maintain contact during entry; additional permits, such as for hot work, that have been issued authorizing work in the permit space; special equipment and procedures, including personal protective equipment and alarm systems; and any other information needed to ensure employee safety.

Cancelled Entry Permits - The entry supervisor must cancel entry permits when an assignment is completed or when new conditions exist. New conditions must be noted on the canceled permit and used in revising the permit space program. The standard requires that the employer keep all canceled entry permits for at least one year.

Worker Training - Before the initial work assignment begins, the employer must provide proper training for all workers who are required to work in permit spaces. After the training, employers must ensure that the employees have acquired the understanding, knowledge and skills necessary to safely perform their duties. Additional training is required when: The job duties change; a change occurs in the permit space program or the permit space operation presents any new hazard; and an employee's job performance shows deficiencies. In addition to this training, rescue team members also require training in CPR and first aid. Employers must certify that this training has been provided.

After completion of training, the employer must keep a record of employee training and make it available for inspection by employees and their authorized representatives. The record must include the employee's name, the trainer's signature or initials and dates of the training.

Confined Space Work Duties

Authorized entrant - Authorized entrants are required to know space hazards, including information on the means of exposure such as inhalation or dermal absorption, signs of symptoms and consequences of the exposure; use appropriate personal protective equipment properly; maintain communication with attendants as necessary to enable them to monitor the entrant's status and alert the entrant to evacuate when necessary; exit from the permit space as soon as possible when ordered by the authorized person; when he or she recognizes the warning signs or symptoms of exposure; when a prohibited condition exists; or when an automatic alarm is activated and alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.

Harnesses and retrieval lines - Authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of their backs near shoulder level or above their heads. Wristlets may be used if the employer can demonstrate that the use of a chest or full body harness is not feasible or creates a greater hazard. Also, the employer must ensure that the other end of the retrieval line is attached to a mechanical device or a fixed point outside the permit space. A mechanical device must be available to retrieve someone from vertical type permit spaces more than five feet (1.524 meters) deep.

Attendants are required to remain outside the permit space during entry operations unless relieved by another authorized attendant; perform non-entry rescues when specified by the employer's rescue procedure; know existing and potential hazards, including information on the mode of exposure, signs or symptoms, consequences and physiological effects; maintain communication with and keep an accurate account of those workers entering the permit space; order evacuation of the permit space when a prohibited condition exists; a worker shows signs of physiological effects of hazard exposure; an emergency outside the confined space exists; and the attendant cannot effectively and safely perform required duties; summon rescue and other services during an emergency; ensure that unauthorized people stay away from permit spaces or exit immediately if they have entered the permit space; inform authorized entrants and the entry supervisor if any unauthorized person enters the permit space; and perform no other duties that interfere with the attendant's primary duties.

Entry supervisors are required to know space hazards including information on the mode of exposure, signs or symptoms and consequences; verify emergency plans and specified entry conditions such as permits, tests, procedures and equipment before allowing entry; terminate entry and cancel permits when entry operations are completed or if a new condition exists; verify that rescue services are available and that the means for summoning them are operable; take appropriate measures to remove

unauthorized entrants; and ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.

Confined Space Emergencies - Rescue service personnel
Employers are required to ensure that responders are capable of responding to an emergency in a timely manner. Employers must provide rescue service personnel with personal protective and rescue equipment, including respirators, and training in how to use it. Rescue service personnel also must receive the authorized entrants training and be trained to perform assigned rescue duties. The standard also requires that all rescuers be trained in first aid and CPR. At a minimum, one rescue team member must be currently certified in first aid and CPR. Employers must ensure that practice rescue exercises are performed yearly and that rescue services are provided access to permit spaces so they can practice rescue operations. Rescuers also must be informed of the hazards of the permit space.

SECTION 01 32 16.15
PROJECT SCHEDULES
(SMALL PROJECTS – DESIGN/BID/BUILD)

PART 1- GENERAL

1.1 DESCRIPTION:

A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).

B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.

C. The Contractor’s representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

A. The Contractor shall submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal shall include:

1. The name and address of the proposed consultant.
2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.

B. The Contracting Officer has the right to approve or disapprove the proposed consultant and will notify the Contractor of the VA decision

within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor’s monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.

B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.

C. The VA will report errors in computer-produced reports to the Contractor’s representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer’s representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost.

Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
   1. Notify the Contractor concerning his actions, opinions, and objections.
   2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised

computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

D. The Complete Project Schedule shall contain approximately _____work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.232 – Article 70 Without NAS-CPM Article 71 Including NAS-CPM for (PAYMENTS UNDER FIXED PRICE CONSTRUCTION).

C. In accordance with FAR 52.236 – 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 – 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.

D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:

1. Show activities/events as:
   a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
   b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
   c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
   d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
   e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.

4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.

B. The Contractor shall submit the following supporting data in addition to the project schedule:
   1. The appropriate project calendar including working days and holidays.
   2. The planned number of shifts per day.
   3. The number of hours per shift.

   Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.

C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COTR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.

D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit an application and certificate for payment using the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.232 – Article 70 Without NAS-CPM for (PAYMENTS UNDER FIXED PRICE CONSTRUCTION). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule.

Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
5. Completion percentage for all completed and partially completed activities/events.
6. Logic and duration revisions required by this section of the specifications.
7. Activity/event duration and percent complete shall be updated independently.

B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule

logic agreed upon by the contractor and COR for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the COR. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the COR within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:

1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
3. Reschedule the work in conformance with the specification requirements.

B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:

1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
3. The schedule does not represent the actual prosecution and progress of the project.
4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.

B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.

C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.

D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 – 4 (Changes, and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 – 4 (Changes). The Contractor

shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.

D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA or USACE review to establish compliance with the contract documents.

B. Detailed submittal requirements are found in the technical sections of the contract specifications. The COR may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.

C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work shall be removed and replaced at the Contractor's expense.

1.2 DEFINITIONS

A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.

B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work shall be integrated and coordinated.

C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.

D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color

samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.

E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.

F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.

H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.

I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation shall indicate whether the material, product, or system has passed or failed the test.

J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.

K. Closeout Submittals: Documentation necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a phase of construction on a multi-phase contract.

1.3 SUBMITTAL REGISTER

A. The submittal register shall list items of equipment and materials for which submittals are required by the specifications. This list may not be all inclusive and additional submittals shall be required by the specifications. The Contractor is not relieved from supplying

submittals required by the contract documents but which have been omitted from the submittal register.

B. The submittal register shall serve as a scheduling document for submittals and shall be used to control submittal actions throughout the contract period.

C. The VA shall provide the initial submittal register in electronic format. Thereafter, the Contractor shall track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the VA.

D. The Contractor shall update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance of all work by COR.

E. The Contractor shall submit formal monthly updates to the submittal register in electronic format. Each monthly update shall document actual submission and approval dates for each submittal.

1.4 SUBMITTAL SCHEDULING

A. Submittals shall be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment.

B. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work shall not be delayed by submittal processing. Allow time for potential resubmittal.

C. No delay costs or time extensions shall be allowed for time lost in late submittals or resubmittals.

D. All submittals are required to be approved prior to the start of the specified work activity.

1.5 SUBMITTAL PREPARATION

A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals shall not be accepted for expedition of construction effort. Submittal shall be returned without review if incomplete.

C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.

D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data shall be returned with review.

E. Provide a transmittal form for each submittal with the following information:
   1. Project title, location and number.
   2. Construction contract number.
   3. Date of the drawings and revisions.
   4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
   5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
   6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
   7. Product identification and location in project.

F. The Contractor is responsible for reviewing and certifying that all submittals comply with contract requirements before submitting for VA or USACE review. Proposed deviations from the contract requirements shall be clearly identified. All deviations submitted shall include a side by side comparison of item being proposed against item specified. Failure to point out deviations shall result in the VA requiring removal and replacement of such work at the Contractor's expense.

G. Stamp, sign, and date each submittal transmittal form indicating action taken.

H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR
(Firm Name)
_____Approved
_____Approved with corrections as noted on submittal data and/or attached sheets(s)
SIGNATURE: _____
TITLE: _____
DATE: _____

1.6 SUBMITTAL FORMAT AND TRANSMISSION

A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the COR.

B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.

C. Electronic files shall be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.

D. E-mail electronic submittal documents smaller than 5MB in size to e-mail addresses as directed by the COR.

E. Provide electronic documents over 5MB through an electronic FTP file sharing system. Confirm that the electronic FTP file sharing system can be accessed from the VA computer network. The Contractor is responsible for setting up, providing, and maintaining the electronic FTP file sharing system for the construction contract period of performance.

F. Provide hard copies of submittals when requested by the COR. Up to 3 additional hard copies of any submittal shall be requested at the discretion of the COR, at no additional cost to the VA.

1.7 SAMPLES

A. Submit two sets of physical samples showing range of variation, for each required item.

B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.

C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

D. Before submitting samples, the Contractor is to ensure that the materials or equipment shall be available in quantities required in the project. No change or substitution shall be permitted after a sample has been approved.

E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.

F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the COR may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.9 TEST REPORTS

A. SRE may require specific test after work has been installed or completed which could require contractor to repair test area at no additional cost to contract.

1.10 VA OR USACE REVIEW OF SUBMITTALS AND RFIS

A. The VA or USACE shall review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project shall assist the VA or USACE in reviewing all submittals and determining contractual compliance. Review shall be only for conformance with the applicable codes, standards and contract requirements.

B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.

C. Period of review for each resubmittal is the same as for initial submittal.

D. VA/USACE review period is 15 working days for submittals.

E. VA/USACE review period is 10 working days for RFIs.

F. The VA/USACE shall return submittals to the Contractor with the following notations:

1. "Approved": authorizes the Contractor to proceed with the work covered.
2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.
3. "Disapproved, revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.
4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" shall be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

1.11 APPROVED SUBMITTALS

A. The VA or USACE approval of submittals is not to be construed as a complete check, and indicates only that the general method of

construction, materials, detailing, and other information are satisfactory.

B. VA or USACE approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work shall be removed and replaced at the Contractor's expense.

C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment shall be considered unless accompanied by an explanation of why a substitution is necessary.

D. Retain a copy of all approved submittals at project site, including approved samples.

1.12 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work shall not be made if required approvals have not been obtained.

---END---

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)

The specifications and standards cited in this solicitation can be examined at the following location:
DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001
Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA	Aluminum Association Inc. http://www.aluminum.org
AABC	Associated Air Balance Council http://www.aabchq.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org
AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AH	American Hort https://www.americanhort.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org
AIA	American Institute of Architects

http://www.aia.org

AISC American Institute of Steel Construction
http://www.aisc.org

AISI American Iron and Steel Institute
http://www.steel.org

AITC American Institute of Timber Construction
https://aitc-glulam.org

AMCA Air Movement and Control Association, Inc.
http://www.amca.org

ANSI American National Standards Institute, Inc.
http://www.ansi.org

APA The Engineered Wood Association
http://www.apawood.org

ARI Air-Conditioning and Refrigeration Institute
http://www.ari.org

ARPM Association for Rubber Product Manufacturers
https://arpm.com

ASABE American Society of Agricultural and Biological Engineers
https://www.asabe.org

ASCE American Society of Civil Engineers
http://www.asce.org

ASHRAE American Society of Heating, Refrigerating, and Air-Conditioning Engineers
http://www.ashrae.org

ASME American Society of Mechanical Engineers
http://www.asme.org

ASSE American Society of Sanitary Engineering International
http://www.asse-plumbing.org

ASTM American Society for Testing and Materials International
http://www.astm.org

AWI Architectural Woodwork Institute
https://www.awinet.org

AWS American Welding Society
https://www.aws.org

AWWA American Water Works Association
https://www.awwa.org

BHMA	Builders Hardware Manufacturers Association https://www.buildershardware.com
BIA	The Brick Industry Association http://www.gobrick.com
CAGI	Compressed Air and Gas Institute https://www.cagi.org
CGA	Compressed Gas Association, Inc. https://www.cganet.com
CI	The Chlorine Institute, Inc. https://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association https://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute https://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute https://www.chainlinkinfo.org
CPA	Composite Panel Association https://www.compositepanel.org
CPMB	Concrete Plant Manufacturers Bureau https://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute https://www.crsi.org
CTI	Cooling Technology Institute https://www.cti.org
DHA	Decorative Hardwoods Association https://www.decorativehardwood.org
DHI	Door and Hardware Institute https://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute https://www.eei.org
EPA	United States Environmental Protection Agency https://www.epa.gov

ETL	ETL Testing Services http://www.intertek.com
FAA	Federal Aviation Administration https://www.faa.gov
FCC	Federal Communications Commission https://www.fcc.gov
FPS	Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.glasswebsite.com
FM	Factory Mutual Global Insurance https://www.fmglobal.com
GA	Gypsum Association https://gypsum.org
GSA	General Services Administration https://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
ICC	International Code Council https://shop.iccsafe.org
ICEA	Insulated Cable Engineers Association https://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers https://www.ieee.org\
IGMA	Insulating Glass Manufacturers Alliance https://www.igmaonline.org
IMSA	International Municipal Signal Association http://www.imsasafety.org
MBMA	Metal Building Manufacturers Association https://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry http://msshq.org
NAAMM	National Association of Architectural Metal Manufacturers https://www.naamm.org

PHCC	Plumbing-Heating-Cooling Contractors Association https://www.phccweb.org
NBS	National Bureau of Standards See - NIST
NBBI	The National Board of Boiler and Pressure Vessel Inspectors https://www.nationalboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association https://www.nema.org
NFPA	National Fire Protection Association https://www.nfpa.org
NHLA	National Hardwood Lumber Association https://www.nhla.com
NIH	National Institute of Health https://www.nih.gov
NIST	National Institute of Standards and Technology https://www.nist.gov
NELMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association (See CPA, Composite Panel Association)
NSF	National Sanitation Foundation http://www.nsf.org
OSHA	Occupational Safety and Health Administration Department of Labor https://www.osha.gov
PCA	Portland Cement Association https://www.cement.org
PCI	Precast Prestressed Concrete Institute https://www.pci.org
PPI	Plastics Pipe Institute https://www.plasticpipe.org
PEI	Porcelain Enamel Institute http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org

RFCI	Resilient Floor Covering Institute https://www.rfci.com
RIS	Redwood Inspection Service (See Western Wood Products Association) https://www.wwpa.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
SJI	Steel Joist Institute https://www.steeljoist.org
SMACNA	Sheet Metal & Air-Conditioning Contractors' National Association https://www.smacna.org
SSPC	The Society for Protective Coatings https://www.sspc.org
STI	Steel Tank Institute https://www.steeltank.com
SWI	Steel Window Institute https://www.steelwindows.com
TCNA	Tile Council of North America https://www.tcnatile.com
TEMA	Tubular Exchanger Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute https://www.tpinst.org
UBC	The Uniform Building Code (See ICC)
UL	Underwriters' Laboratories Incorporated https://www.ul.com
ULC	Underwriters' Laboratories of Canada https://www.ulc.ca
WCLB	West Coast Lumber Inspection Bureau http://www.wclib.org
WDMA	Window and Door Manufacturers Association https://www.wdma.com

WRCLA Western Red Cedar Lumber Association
https://www.realcedar.com

WWPA Western Wood Products Association
http://www.wwpa.org

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SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies requirements for Contractor Quality Control (CQC) for Design-Bid-Build (DBB) or Design-Build (DB) construction projects. This section can be used for both project types.

1.2 APPLICABLE PUBLICATIONS

A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. ASTM International (ASTM)

1. D3740 - (2012a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
2. E329 - (2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.3 SUBMITTALS

A. Government approval is required for all submittals. CQC inspection [Applicable CQC Control Phase (Preparatory, Initial, or Follow-Up)]: [Applicable Specification section] reports shall be submitted under this Specification section and follow the naming convention.

1. Preconstruction Submittals
   a. Interim CQC Plan
   b. CQC Plan
   c. Additional Requirements for Design Quality Control (DQC) Plan
2. Design Data
   a. Discipline-Specific Checklists
   b. Design Quality Control
3. Test Reports
   a. Verification Statement

PART 2 PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with the FAR Clause 52.246.12 titled “Inspection of Construction”. QC consists of plans, procedures, and organization

necessary to produce an end product which complies with the Contract requirements. The QC system covers all design and construction operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Office or Authorized designee for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CQC PLAN:

A. Submit no later than than 30 days after receipt of Notice to Proceed (NTP) proposed to implement the requirements of the FAR Clause 52.246.12 titled "Inspection of Construction". The Government will consider an Interim CQC Plan for the first 30 days of operation, which must be accepted within 5 business days of NTP. Design and/or construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an Interim plan applicable to the particular feature of work to be started. Work outside of the accepted Interim CQC Plan will not be permitted to begin until acceptance of a CQC Plan or another Interim CQC Plan containing the additional work scope is accepted.

B. Content of the CQC Plan: Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record consultants, architects/engineers (A/E), fabricators, suppliers, and purchasing agents:

1. A description of the QC organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.
2. The name, qualifications (in resume format) duties, responsibilities, and authorities of each person assigned a CQC function.

3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will to the Contracting Officer or Authorized designee. be issued by the CQC System Manager. Furnish copies of these letters
4. Procedures for scheduling, reviewing, certifying, and managing submittals including those of subcontractors, designers of record, consultants, A/E's offsite fabricators, suppliers and purchasing agents. These procedures must be in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.
5. Control, verification, and acceptance of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer or Authorized designee are required to be used)
6. Procedures for tracking Preparatory, Initial, and Follow-Up control phases and control, verification, and acceptance tests including documentation.
7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
8. Reporting procedures, including proposed reporting formats.
9. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of specifications can generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Coordination meeting.

10. Coordinate schedule work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections and Schedule of Special Inspections. Where the applicable Code issue by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the CQC Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the CQC Plan.

C. Additional Requirements for Design Quality Control (DQC) Plan: The following additional requirements apply to the DQC Plan for DB projects only and not DBB projects:

1. Submit and maintain a DQC Plan as an effective QC program which assures that all services required by this contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, all documents must be technically reviewed by competent, independent reviewers identified in the DQC Plan. The same element that produced the product may not perform the independent technical review (ITR). Correct errors and deficiencies in the design documents prior to submitting them to the Government.
2. Include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific Contract period. This should be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item. This should be a forward planning as well as a project monitoring tool. The schedule reflects calendar days and not dates for each activity. If the schedule is changed, submit a revised schedule reflecting the change within 7 calendar days. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit at each design phase as part of the project documentation these completed discipline-specific checklists.
3. Implement the DQC Plan by a DQC Manager who has the responsibility of being cognizant of and assuring that all documents on the project

have been coordinated. This individual must be a person who has verifiable engineering or architectural design experience and is a Professional Engineer or Registered Architect within the state of Construction location. Notify the Contracting Officer or Authorized designee, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

D. Acceptance of Plan: Acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in the CQC Plan and operations including removal of personnel as necessary, to obtain the quality specified.

E. Notification of Changes: After acceptance of the CQC Plan, notify the Contracting Officer or Authorized designee in writing of any proposed change. Proposed changes are subject to acceptance by the Government prior to implementation by the Contractor.

3.3 COORDINATION MEETING:

After the Preconstruction Conference Post-award Conference before start of design or construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized designee to discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 2 business days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CC operations, design activities (if applicable), control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and Contracting Officer or Authorized designee and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION:

A. Personnel Requirements: The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, a Design Quality Manager (if applicable), and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager shall satisfy the requirements of Specification 01 35 26 Safety Requirements and reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer or Authorized designee. Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawings submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Government.

B. CQC System Manager: Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC system Manager is required to be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 3 years construction experience on construction similar to the scope of this Contract. This CQC System manager is on the site at all times during construction and is employed by the General Contractor. The CQC System Manger is assigned as CQC System Manager but has duties as project superintendent in addition to quality control. Identify in the plan an alternate to serve in the event of the CDQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

C. CQC Personnel: In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist in the CQC System Manager for the following areas, as applicable: electrical, mechanical, civil, structural, environmental, architectural, materials technician submittals clerk, Commissioning Agent/LEED specialist, and low voltage systems. These individuals or specified technical companies are employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the Experience Matrix listed herein. These individuals other duties but need to be allowed sufficient time to perform the specialized personnel's assigned quality controls duties as described in the .CQC Plan. A single person can cover more than one area provided that the single person is qualified to perform QC activities in each designated and that workload allows.

EXPERIENCE MATRIX

Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 2 years experience in the type of work being performed on this project or technician with 5 years related experience.
Mechanical	Graduate Mechanical Engineer with 2 years experience or construction professional with 5 years of experience supervising mechanical features of work in the field with a construction company.
Electrical	Graduate Electrical Engineer with 2 years related experience or construction professional with 5 years of experience supervising electrical features of work in the field with a construction company.

Area	Qualifications
Structural	Graduate Civil Engineer (with Structural Track or Focus), Structural Engineer, or Construction Manager with 2 years experience or construction professional with 5 years experience supervising structural features of work in the field with a construction company.
Architectural	Graduate Architect with 2 years experience or construction professional with 5 years of related experience.
Environmental	Graduate Environmental Engineer with 3 years experience.
Submittals	Submittal Clerk with 1 year experience.
Concrete, Pavement, and Soils	Materials Technician with 2 years experience for the appropriate area.
Testing, Adjusting, and Balancing (TAB)	Specialist must be a member of AABC or an experienced technician of the firm certified by the NEBB.
Design Quality Control Manager	Registered Architect or Professional Engineer

D. Additional Requirements: In addition to the above experience and education requirements, the CQC System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Construction course. If the CQC System Manager does not have a current specification, obtain the CQM for Contractors course identification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the U.S. Army Corps of Engineers. Contact the Contracting Officer or Authorized designee for information on the next scheduled class.

E. Organizational Changes: Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer or Authorized designee for acceptance.

3.5 SUBMITTALS AND DELIVERABLES:

A. Submittals have to comply with the requirements in Section 01 33 23 Shop Drawings, Product Data, and Samples. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00 General Commissioning Requirements is included in the contract, the submittals required by the section have to be coordinated with the Section 01 33 23 Shop Drawings, Product Data, and Samples to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL:

A. CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

1. Preparatory Phase: This phase is performed prior to beginning work on each definable feature of work after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:
   a. A review of each paragraph of applicable specifications, references codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
   b. Review of the Contract drawings.
   c. Check to assure that all materials and equipment have been tested, submitted, and approved.
   d. Review of provisions that have been made to provide required control inspection and testing.
   e. Review Special Inspections required by Section 01 45 35 Special Inspections, that Statement of Special Inspections and the Schedule of Specials Inspections.
   f. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.

g. Examination of required materials, equipment, and sample work to assure that they are on hand conform to approved shop drawings or submitted data, and are properly stored.
h. Review of the appropriate Activity Hazard Analysis (AHA) to assure safety requirements are met.
i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards – contract defined or industry standard if not contract defined - for that feature of work.
j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
k. Discussion of the initial control phase.
l. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the Preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the Preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

B. Initial Phase: This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:
1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the Preparatory meeting.
2. Verify adequacy of controls to ensure full contract compliance. Verify the required control inspection and testing is in compliance with the contract.
3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
4. Resolve all differences.
5. Check safety to include compliance with an upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

6. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the initial phase for definable features of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with Follow-Up phases.
7. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
8. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections.

C. Follow-Up Phase: Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements until the completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final Follow-Up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections

D. Additional Preparatory and Initial Phases on the same definable features of work if: the quality ongoing work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

A. Testing Procedure: Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance test when specified. Procure the services of a Department of Veteran Affairs approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.
2. Verify that facilities and testing equipment are available and comply with testing standards.
3. Check test instrument calibration data against certified standards.
4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
5. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the unique sequential control number identifying the test. If approved by the Contracting Officer or Authorized designee, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer or Authorized designee. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

B. Testing Laboratories: All testing laboratories must be validated through the procedures contained in Specification section 01 45 29 Testing Laboratory Services.
   1. Capability Check: The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician’s testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.
   2. Capability Recheck: If the selected laboratory fails the capability check, the Contractor will be assessed a charge equal to value of recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

C. Onsite Laboratory: The Government reserves the right to utilize the Contractor’s control testing laboratory and equipment to make assurance tests, and to check the Contractor’s testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

A. Punch-Out Inspection: Conduct an inspection of the work by the CQC system Manager near the end of the work, or any increment of the work established by a time stated FAR 52.211-10 – Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final Inspection.

52.211-10 -- Commencement, Prosecution, and Completion of Work.

As prescribed in 11.404(b), insert the following clause in solicitations and contracts when a fixed-price construction contract is contemplated. The clause may be changed to accommodate the issuance of orders under indefinite-delivery contracts for construction.

Commencement, Prosecution, and Completion of Work (Apr 1984)

The Contractor shall be required to:
(a) commence work under this contract within _____ *// Contracting Officer insert number//* calendar days after the date the Contractor receives the notice to proceed,
(b) prosecute the work diligently, and
(c) complete the entire work ready for use not later than _____.* The time stated for completion shall include final cleanup of the premises.

(End of Clause)

* The Contracting Officer shall specify either a number of days after the date the contractor receives the notice to proceed, or a calendar date.

Alternate I (Apr 1984). If the completion date is expressed as a specific calendar date, computed on the basis of the contractor receiving the notice to proceed by a certain day, add the following paragraph to the basic clause:

The completion date is based on the assumption that the successful offeror will receive the notice to proceed by_____ *// Contracting Officer insert date //.* The completion date will be extended by the number of calendar days after the above date that the Contractor receives the notice to proceed, except to the extent that the delay in issuance of the notice to proceed results from the failure of the Contractor to execute the contract and give the required performance and payment bonds within the time specified in the offer.

B. Pre-Final Inspection: The Government will perform the Pre-Final Inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final Acceptance Inspection with the customer can be scheduled. Correct any items noted on the Pre-Final Inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate construction completion dates.

C. Final Acceptance Inspection: The Contractor’s QC Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer’s Authorized designee is required to be in attendance at the Final Acceptance Inspection. Additional Government personnel can also be in attendance. The Final Acceptance Inspection will be formally scheduled by the Contracting Officer’s or Authorized designee based upon results of the Pre-Final Inspection. Notify the Contracting Officer through the COR office at least 14 days prior to the Final Acceptance Inspection and include the Contractor’s assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date schedule for the

Final Acceptance Inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with FAR Clause 52.246-12 titled "Inspection of Construction".

3.9 DOCUMENTATION

A. Quality Control Activities: Maintain current records providing factual evidence that required QC activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:
   1. The name and area of responsibility of the Contractor/Subcontractor
   2. Operating plant/equipment with hours worked, idle, or down for repair.
   3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
   4. Test and control activities performed with results and references to specification/drawing requirements. Identify the Control Phase (Preparatory, Initial, and/or Follow-Up). List deficiencies noted, along with corrective action.
   5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specification/drawing requirements.
   6. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.
   7. Offsite surveillance activities, including actions taken.
   8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
   9. Instructions given/received and conflicts in plans and specifications.
   10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of the Independent Technical Reviewer (ITR) team, the ITR review comments, responses, and the record of resolution of the comments.

B. Verification Statement: Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and

deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily with 1 week after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit on report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate QC personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

See SAM Form 696: Contractor's Quality Control Report following this section. It is the printed version of 01 45 00 Referenced Example Form Template.

014500 Referenced Example Form Templa

3.11 NOTIFICATION OF NONCOMPLIANCE: The Contracting Officer or Authorized designee will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor should take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

--- END ---

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the General Contractor.

1.2 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO):

T27-11.....Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates

T96-02 (R2006).....Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

T99-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop

T104-99 (R2007).....Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

T180-10.....Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop

T191-02(R2006).....Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method

T310-13.....Standard Method of Test for In-place Density and Moisture Content of Soil and Soil-aggregate by Nuclear Methods (Shallow Depth)

C. American Concrete Institute (ACI):

506.4R-94 (R2004).....Guide for the Evaluation of Shotcrete

D. American Society for Testing and Materials (ASTM):

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A370-12.....Standard Test Methods and Definitions for Mechanical Testing of Steel Products

A416/A416M-10.....Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

A490-12.....Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field

C33/C33M-11a.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C109/C109M-11b.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

C136-06.....Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C138/C138M-10b.....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C140-12.....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C143/C143M-10a.....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b.....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C330/C330M-09.....Standard Specification for Lightweight Aggregates for Structural Concrete

C567/C567M-11.....Standard Test Method for Density Structural Lightweight Concrete

C780-11.....Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C1019-11.....Standard Test Method for Sampling and Testing Grout

C1064/C1064M-11.....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c.....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1314-11a.....Standard Test Method for Compressive Strength of Masonry Prisms

D422-63(2007).....Standard Test Method for Particle-Size Analysis of Soils

D698-07e1.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

D1140-00(2006).....Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve

D1143/D1143M-07e1.....Standard Test Methods for Deep Foundations Under Static Axial Compressive Load

D1188-07e1.....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

D1556-07.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3 (2,700 KNm/m3))

D2166-06.....Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

D2167-08).....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2216-10.....Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2974-07a.....Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-11.....Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D3740-11.....Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E94-04(2010).....Standard Guide for Radiographic Examination

E164-08.....Standard Practice for Contact Ultrasonic Testing of Weldments

E329-11c.....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing

E605-93(R2011).....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members

E709-08.....Standard Guide for Magnetic Particle Examination

E1155-96(R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers

E. American Welding Society (AWS):

D1.D1.1M-10.....Structural Welding Code-Steel

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories shall be accredited by a laboratory accreditation authority and shall be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory’s scope of accreditation shall include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the “Corporate Office.”

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests

requested by COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COR to such failure.

C. Written Reports: Testing laboratory shall submit test reports to COR, Contractor, unless other arrangements are agreed to in writing by the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to COR immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SITE WORK CONCRETE:

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.2 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of COR with concurrence of COR and perform periodic inspections thereafter as determined by COR.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to COR.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads shall be removed from the site at the Contractor’s expense. Any rejected concrete that is placed shall be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m^3 (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by COR make three cylinders for each 80 m^3 (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. COR shall require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day’s pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m^3 (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m^3 (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.

8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
    a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
    b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:
    a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
    b. Inspect preparation of construction, expansion, and isolation joints.
16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
17. Observe concrete mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.

18. Measure concrete flatwork for levelness and flatness as follows:
    a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
    c. Provide the Contractor and the COR with the results of all profile tests, including a running tabulation of the overall F_F and F_L values for all slabs installed to date, within 72 hours after each slab installation.
19. Other inspections:
    a. Grouting under base plates.
    b. Grouting anchor bolts and reinforcing steel in hardened concrete.

C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by COR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to COR. In test report, indicate the following information:
    a. Cylinder identification number and date cast.
    b. Specific location at which test samples were taken.
    c. Type of concrete, slump, and percent air.
    d. Compressive strength of concrete in MPa (psi).
    e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
    f. Weather conditions during placing.
    g. Temperature of concrete in each test cylinder when test cylinder was molded.
    h. Maximum and minimum ambient temperature during placing.

i. Ambient temperature when concrete sample in test cylinder was taken.

j. Date delivered to laboratory and date tested.

3.4 MASONRY:

A. Mortar Tests:

1. Laboratory compressive strength test:

a. Comply with ASTM C780.

b. Obtain samples during or immediately after discharge from batch mixer.

c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.

d. Test one sample at 7 days and 2 samples at 28 days.

2. Two tests during first week of operation; one test per week after initial test until masonry completion.

B. Grout Tests:

1. Laboratory compressive strength test:

a. Comply with ASTM C1019.

b. Test one sample at 7 days and 2 samples at 28 days.

c. Perform test for each 230 m^2 (2500 square feet) of masonry.

C. Masonry Unit Tests:

1. Laboratory Compressive Strength Test:

a. Comply with ASTM C140.

b. Test 3 samples for each 460 m^2 (5000 square feet) of wall area.

D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m^2 (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

E. Concrete:

Making and Curing Concrete Test Cylinders (ASTM C31) _____

Compressive Strength, Test Cylinders (ASTM C39) _____

Concrete Slump Test (ASTM C143) _____

Concrete Air Content Test (ASTM C173) _____

Unit Weight, Lightweight Concrete (ASTM C567) _____

Aggregate, Normal Weight: Gradation (ASTM C33) _____

Deleterious Substances (ASTM C33) _____

Soundness (ASTM C33) _____

Abrasion (ASTM C33) _____

Aggregate, Lightweight Gradation (ASTM C330) _____

Deleterious Substances (ASTM C330) _____

Unit Weight (ASTM C330) _____

Flatness and Levelness Readings (ASTM E1155) (number of days) _____

F. Reinforcing Steel:

Tensile Test (ASTM A370) _____

Bend Test (ASTM A370) _____

Mechanical Splice (ASTM A370) _____

Welded Splice Test (ASTM A370) _____

G. Shotcrete:

Taking and Curing Test Cores (ACI 506) _____

Compressive Strength, Test Cores (ACI 506) _____

H. Technical Personnel:

1. Technicians to perform tests and inspection listed above. Laboratory shall be equipped with concrete cylinder storage facilities, compression machine, cube molds, proctor molds, balances, scales, moisture ovens, slump cones, air meter, and all necessary equipment for compaction control.

---END---

SECTION 01 45 35
SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This guide specification will be applicable to both new buildings and existing building rehabilitations/renovations. In addition to the Special Inspection and testing specified requirements, a registered design professional must perform structural observations during construction. All observed deficiencies will be immediately reported to the Contracting Officer. The registered design professional performing these observations will be a representative of the Designer of Record (DOR) for the building being constructed.

B. Structural observations are required for the following project conditions per IBC Chapter 17:

1. Seismic Design Category D, E or F; and assigned to Risk Cat III, IV or V.
2. Seismic Design Category D, E or F; and with a height greater than 22860 mm 75 ft.
3. Seismic Design Category E, assigned to Risk Category I or II and the building is greater than two stories above grade plane.
4. Nominal design wind speed in excess of 49 m/sec 110 mph; and assigned to Risk Cat III, IV or V.
5. Nominal design wind speed in excess of 49 m/sec 110 mph; and with a height greater than 23 m 75 ft.

1.2 APPLICABLE PUBLICATIONS

A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. American Society of Civil Engineers (ASCE)

1. ASCE 7 - (2010; Errata 2011; Supp 2 2013) Minimum Design Loads for Buildings and Other Structures

C. International Code Council (ICC)

1. ICC IBC - (2015) International Building Code

1.3 GENERAL REQUIREMENTS

A. Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections and Chapter 17 of ICC IBC. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections

are to be performed by an independent third party and are intended to ensure that the work of the prime contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

B. Structural observations will be performed by the Government. The contractor must provide notification to the Contracting Officer 14 days prior to the following points of construction that structural observations need to occur:

1.4 DEFINITIONS

A. Continuous Special Inspections – The constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks.

B. Periodic Special Inspections – Special Inspections by the special inspector who is intermittently present where the work to be inspected has been or is being performed. Specific time interval on a specific Special Inspection should be indicated on the Schedule of Special Inspections.

C. Perform – Perform these Special Inspections tasks for each welded joint or member.

D. Observe – Observe these Special Inspections items on a random daily basis. Operations need not be delayed pending these inspections.

E. Special Inspector (SI) – A qualified person retained by the contractor and approved by the Contracting Officer as having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Prime Contractor.

F. Associate Special Inspector (ASI) – A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.

G. Third Party – A third party inspector must not be company employee of the Contractor or any Sub-Contractor performing the work to be inspected.

H. Special Inspector of Record (SIOR) – SIOR must be an independent third party hired directly by the Prime Contractor and is required for the following project conditions:

1. Seismic Design Category D, E, or F; and assigned to Risk Category III, IV, or V.
2. Seismic Design Category D, E, or F; and with a height greater than 22860mm 75 ft.
3. Seismic Design Category E, assigned to Risk Category I or II and the building is greater than two (2) stories above grade plane.
4. Nominal design wind speed in excess o f49 m/sec 100 mph; and assigned to Risk Category III, IV, or V.
5. Nominal design wind speed in excess of 49 mm/sec 100mph; and with a height greater than 23m 75ft.
6. In addition to these conditions, the DOR is encouraged to consider using an SIOR on large magnitude or critical projects where this additional level of quality control is affordable.

I. Contracting Officer – The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).

J. Designer of Record (DOR) – A registered design professional is contracted by the Government as an A/E responsible for the overall design and review of submittal documents prepared by others. The DOR is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in state in which the design professional works. The DOR is also referred to as the Engineer of Record (EOR) in design code documents.

1.

SECTION 01 45 35
Schedule of SI Templa

SECTION 01 45 35
Statement of SI Temp

a. Submittals: Government approval is required for all submittals. CQC Special Inspection reports shall be submitted under this Specification section and follow the [Special Inspection]:

[Applicable Specification section or description] naming convention. Submit the following:

1) SD-01 Preconstruction Submittals;
2) SIOR Letter of Acceptance;
3) Special Inspections Project Manual;
4) Special Inspections Agency's Written Practices
5) NDT Procedures and Equipment' Calibration Records;
6) SD-06 Test Reports;
7) Special Inspections
8) Daily Reports;
9) Special Inspections; Biweekly Reports;
10) SD-07 Certificates;
11) Fabrication Plant
12) Steel Truss Plant;
13) Wood Truss Plant;
14) AC472 Accreditation;
15) Steel Joist Institute Membership;
16) Precast Concrete Institute (PCI) Certified Plant;
17) Certificate of Compliance;
18) Special Inspector of Record Qualifications;
19) Special Inspector Qualifications;
20) Qualification Records for NDT technicians;
21) SD-11 Closeout Submittals;
22) Interim Final Report of Special Inspections;
23) Comprehensive Final Report of Special Inspections;

b. Special Inspector Qualifications: Submit qualifications for each SI, ASI, and the SIOR from the following certifying associations: Associated Air Balance Council (AABC); American Concrete Institute (ACI); Association of the Wall and Ceiling Industry (AWCI); American Welding Society (AWS); Factory Mutual (FM); International Code Council (ICC); Nondestructive Testing (NDT); National Institute for Certification in Engineering Technologies (NICET); Precast/Prestressed Concrete Institute (PCI); Post-Tensioning Institute (PTI); Underwriters Laboratories (UL). Qualifications should be in accordance with the following minimums ; PM or SRE can restrict qualifications to the higher standards shown if multiple options are shown for a role based on complexity of project.

QUALIFICATIONS

Area	Special Inspector	Associated Special Inspector	SIOR
Steel Construction and High Strength Bolting	ICC Structural Steel and Bolting Special Inspector certificate with on year of related experience, or Registered Professional Engineer with related experience.	Engineer-In-Training with one year of related experience.	
Welding Structural Steel (For highly complex steel use only AWS Certified Welding Inspectors)	ICC Welding Special Inspector certificate with one year of related experience or AWS Certified Welding Inspector	AWS Certified Associate Welding Inspector	
Nondestructive Testing of Welds	NDT Level II Certificate	NDT Level II Certificate plus one year of related experience	
Cold Formed Steel Framing	ICC Structural Steel and Bolting Special Inspector certificate with on year of related experience, or ICC Commercial Building Inspector with one year of experience; or Registered Professional Engineer with related experience.	Engineer-In-Training with one year of related experience.	
Concrete Construction	ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or ACI Concrete	ACI Concrete Construction Special Inspector in Training, or Engineer-In-Training	

Area	Special Inspector	Associated Special Inspector	SIOR
	Construction Special Inspector, or NICET Concrete Technician Level III Certificate in Construction Materials Testing, or, Registered Professional Engineer with related experience	with one year of related experience	
Prestressed Concrete Construction	ICC Pre-stressed Special Inspector Certificate with one year of related experience, or PCI Quality Control Technician/ Inspector Level II Certificate with one year of related experience, or Registered Professional Engineer with related experience.	PCI Quality Control Technician/ Inspector Level I Certificate with one year of related experience, or Engineer-In-Training with one year of related experience	
Post-Tensioned Concrete Construction	PTI Level 2 Unbonded PT Inspector Certificate, or Registered Professional Engineer with related experience	PTI Level 1 Unbonded PT Inspector Certificate with one year of related experience, or Engineer-In-Training with one year of related experience	
Masonry Construction	ICC Structural Masonry Special Inspector Certificate with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience	

Area	Special Inspector	Associated Special Inspector	SIOR
Wood	ICC Commercial Building Inspector Certificate with one year of related experience, or ICC Residential Building Inspector with on year of experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience	
Verification of Site Soil Condition, Fill Placement, and Load-Bearing Requirements	ICC Soils Special Inspector Certificate with one year of related experience, or NICET Soils Technician Level II Certificate in Construction Material Testing, or NICET Geotechnical Engineering Technician Level II Construction or Generalist Certificate, or Geologist-In-Training with one year of related experience, or Registered Professional Engineer with related experience	NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or NICET Geotechnical Engineering Technician Level I Construction, or Generalist Certificate with one year of related experience, or Engineer-In-Training with one year of related experience	
Deep Foundations	NICET Soils Technician Level II Certificate in Construction Material Testing, or NICET Geotechnical Engineering Technician Level II Construction or	NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or NICET Geotechnical Engineering	

Area	Special Inspector	Associated Special Inspector	SIOR
	Generalist Certificate, or Geologist-In-Training with one year of related experience, or Registered Professional Engineer with related experience	Technician Level I Construction or Generalist Certificate with one year of related experience, or Engineer-In-Training with one year of related experience	
Sprayed Fire Resistant Manual	ICC Spray-applied Fireproofing Special Inspector Certificate, or ICC Fire Inspector I Certificate with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience	
Mastic and Intumescent Fire Resistant Coatings	ICC Spray-applied Fireproofing Special Inspector Certificate, or ICC Fire Inspector I Certificate with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience.	
Exterior Insulation and Finish Systems (EIFS)	AWCI EIFS Inspector Certificate, or Exterior Design Institute Certificate, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience	

Area	Special Inspector	Associated Special Inspector	SIOR
Fire-Resistant Penetrations and Joints	Passed the UL Firestop Exam with one year of related experience, or Passed the FM Firestop Exam with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience.	
Smoke Control	AABC Technician Certification with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience.	
SIOR			Registered Professional Engineer

PART 2 - PRODUCTS

2.1 FABRICATORS SPECIAL INSPECTION

A. Special Inspections of fabricator's work performed in the fabricator's shop is required to be inspected in accordance with the Statement of Special Inspections and the Schedule of Special Inspections unless the fabricator is certified by the approved agency to perform such work without Special Inspections. Submit the applicable certification(s) from the following list to the Contracting Officer for information to allow work performed in the fabricator's shop to not be subjected to Special Inspections.

B. The following certifications meet the requirements for fabricator approval in accordance with paragraph 1704.2.5.2 of IBC:

1. American Institute of Steel Construction (AISC) Certified Fabrication Plant, Category STD.

2. Truss Plate Institute (TPI) steel truss plate quality assurance program certification.
3. Truss Plate Institute (TPI) wood truss plate quality assurance program certification.
4. International Accreditation Service, AC472 Accreditation Steel Joist Institute Membership
5. Precast Concrete Institute (PCI) Certified Plant, Group C

C. At the completion of fabrication, submit a certificate of compliance, to be included with the comprehensive final report of Special **Inspections, stating that the materials supplied and work performed by** the fabricator are in accordance the construction documents.

PART 3 - EXECUTION

3.1 RESPONSIBILIES MATRIX

Inspector	Responsibility	Condition
SIOR	a. Supervise all Special Inspectors required by the contract documents and the IBC. b. Submit a SIOR Letter of Acceptance to the Contracting Officer attesting to acceptance of the duties of SIOR, signed and sealed by the SIOR. c. Verify the qualifications of all of the Special Inspectors. d. Verify the qualifications of fabricators.	Applicable when SIOR is required
	e. Submit Special Inspections agency's written practices for the monitoring and control of the agency's operations to include the following: 1. The agency's procedures for the selection and administration of inspection personnel, describing the training, experience and examination requirements for qualifications and certification of inspection personnel. 2. The agency's inspection procedures, including general inspection, material controls, and visual welding inspection. f. Submit qualification records for nondestructive testing (NDT) technicians designated for the project. Submit NDT procedures and equipment calibration records for NDT to be performed and equipment to be used for the project.	Applicable when SIOR is required and when the structural design is required to follow AISC341 for seismic design of steel structures

Inspector	Responsibility	Condition
	g. Prepare a Special Inspections Project Manual, which will cover the following: 1. Roles and responsibilities of the following individuals during Special Inspections: SIOR, SI, General Contractor, Subcontractors, QC Manager, and DOR. 2. Organizational chart and/or communication plan, indicating lines of communication 3. Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors. Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors. 4. Indicate the government reporting procedures. 5. Propose forms or templates to be used by SI and SIOR to document inspections. 6. Indicate procedures for tracking nonconforming work and verification that corrective work is complete. 7. Indicate how the SIOR and/or SI will participate in weekly QC meetings. 8. Indicate how Special Inspections of shop fabricated items will be handled when the fabricator's shop is not certified per paragraph FABRICATOR SPECIAL INSPECTIONS. 9. Include a section in the manual that covers each specific item requiring Special Inspections that is indicated on the Schedule of Special Inspections. Provide names and qualifications of each special inspector who will be performing the Special Inspections for each specific item. Provide detail on how the Special Inspections are to be carried out for each item so that the expectations are clear for the General Contractor and the Subcontractor performing the work. Make a copy of the Special Inspections Project Manual available on the job site during construction. Submit a copy of the Special Inspections Project Manual for approval.	Applicable when SIOR is required

Inspector	Responsibility	Condition
	h. Attend coordination and mutual understanding meeting where the information in the Special Inspections Project Manual will be reviewed to verify that all parties have a clear understanding of the Special Inspections provisions and the individual duties and responsibilities of each party. i. Maintain a 3- ring binder for the Special Inspector's daily and biweekly reports and the Special Inspections Project Manual. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the DOR. j. Submit a copy of the Special Inspector's daily reports to the QC Manager. k. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report. l. Submit a biweekly Special Inspections report until all work requiring Special Inspections is complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following: 1. A brief summary of the work performed during the reporting time frame. 2. Changes and/or discrepancies with the drawings, specifications, and mechanical or electrical component certification if they require seismic systems, that were observed during the reporting period. 3. Discrepancies which were resolved or corrected. 4. A list of nonconforming items requiring resolution. 5. All applicable test results including nondestructive testing reports.	
QC Manager	a. If there is no SIOR, QC Manager must Supervise all Special Inspectors required by the contract documents and the IBC; Verify the qualifications of all of the Special Inspectors; Verify the qualifications of fabricators; Maintain a 3-ring binder for the Special Inspector's daily	Applicable when SIOR is not required

Inspector	Responsibility	Condition
	and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the DOR.	
	b. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.	n/a
Special Inspectors	a. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections. b. Attend preparatory phase meetings related to the Definable Feature of Work (DFOW) for which the special inspector is qualified to inspect.	
	c. Submit Special Inspections agency's written practices for the monitoring and control of the agency's operations to include the following: 1. The agency's procedures for the selection and administration of inspection personnel, describing the training, experience and examination requirements for qualifications and certification of inspection personnel. 2. The agency's inspection procedures, including general inspection, material controls, and visual welding inspection. d. Submit qualification records for nondestructive testing (NDT) technicians designated for the project. e. Submit NDT procedures and equipment calibration records for NDT to be performed and equipment to be used for the project.]	Applicable when SIOR is NOT required and when the structural design is required to follow AISC 341 for seismic design of steel structures
	f. Submit a copy of the daily reports to the QC Manager. g. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report. h. Submit a biweekly Special Inspection Report until all inspections are complete. A report is required for each biweekly period in which	Applicable when SIOR is not required

Inspector	Responsibility	Condition
	Special Inspections activity occurs, and must include the following: 1. A brief summary of the work performed during the reporting time frame 2. Changes and/or discrepancies with the drawings, specifications, and mechanical or electrical component certification if they require seismic systems that were observed during the reporting period. 3. Discrepancies which were resolved or corrected. 4. A list of nonconforming items requiring resolution. 5. All applicable test result including nondestructive testing reports. j. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project and corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.	
	k. Submit daily reports to the SIOR	Applicable when SIOR is required

3.2 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Government to accept such work.

---END---

SCHEDULE OF SPECIAL INSPECTIONS

Reference UFGS 01 45 35 for all requirements not noted as part of this schedule.

INSPECTION DEFINITIONS:

PERFORM: Perform these tasks for each weld, fastener or bolted connection, and noted verification.

OBSERVE: Observe these items randomly during the course of each work day to insure that applicable requirements are being met. Operations need not be delayed pending these inspections at contractor's risk.

DOCUMENT: Document, with a report, that the work has been performed in accordance with the contract documents. This is in addition to any other reports required in the Special Inspections guide specification.

CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

The Seismic Design Category for this project is: ☐ A, ☐ B, ☐ C, ☐ D, ☐ E, ☐ F (check appropriate box)

DESIGNER NOTES (delete this box after reviewing):

1. This schedule contains minimum requirements. Do not delete applicable inspection tasks unless notes in blue indicate it is acceptable to do so.
2. Blue text = designers notes. The designer must review and edit all blue text in this schedule prior to inserting this schedule into the special inspections spec (UFGS 01 45 35).
3. Check section boxes with ANY inspection tasks applicable to your project. You may choose to delete unchecked sections or leave them in the schedule unchecked.
4. Individual rows/tasks that that are not applicable to the project may be left in the section, as the inspector can determine whether they occur/apply (e.g. metal trusses in the light gauge framing section for example).
5. Design discipline sections are color coded for easier reference by designers. This schedule does NOT need to be printed in color.
6. When finished editing, delete this note box and save this schedule as a PDF and insert into the project specifications (special inspections section).

STRUCTURAL - STEEL – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION PRIOR TO WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-1		
TASK	INSPECTION TYPE[1]	DESCRIPTION
1. Verify that the welding procedures specification (WPS) is available	**PERFORM**	
2. Verify manufacturer certifications for welding consumables are available	**PERFORM**	
3. Verify material identification	**PERFORM**	Type and grade.
4. Welder Identification System	**PERFORM**	The fabricator or erector, as applicable, shall maintain a system by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress type.
5. Fit-up of groove welds (including joint geometry)	OBSERVE	✓ Joint preparation ✓ Dimensions (alignment, root opening, root face, bevel) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location) ✓ Backing type and fit (if applicable)
6. Configuration and finish of access holes	OBSERVE	
7. Fit-up of fillet welds	OBSERVE	✓ Dimensions (alignment, gaps at root) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location)
STEEL INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-2		
TASK	INSPECTION TYPE	DESCRIPTION
8. Use of qualified welders	**PERFORM**	Welding by welders, welding operators, and tack welders who are qualified in conformance with requirements.
9. Control and handling of welding consumables	OBSERVE	✓ Packaging ✓ Electrode atmospheric exposure control
10. No welding over cracked tack welds	OBSERVE	
11. Environmental conditions	OBSERVE	✓ Wind speed within limits ✓ Precipitation and temperature
12. Welding Procedures Specification followed	OBSERVE	✓ Settings on welding equipment ✓ Travel speed ✓ Selected welding materials ✓ Shielding gas type/flow rate ✓ Preheat applied

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

		✓ Interpass temperature maintained (min./max.) ✓ Proper position (F, V, H, OH) ✓ Intermix of filler metals avoided
13. Welding techniques	OBSERVE	✓ Interpass and final cleaning ✓ Each pass within profile limitations ✓ Each pass meets quality requirements

STRUCTURAL - STEEL – WELDING SECTION (CONTINUED)

STEEL INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
14. Welds cleaned	OBSERVE	
15. Size, length, and location of all welds	**PERFORM**	Size, length, and location of all welds conform to the requirements of the detail drawings.
16. Welds meet visual acceptance criteria	**PERFORM AND DOCUMENT**	✓ Crack prohibition ✓ Weld/base-metal fusion ✓ Crater cross section ✓ Weld profiles ✓ Weld size ✓ Undercut ✓ Porosity
17. Arc strikes	**PERFORM**	
18. k-area	**PERFORM**	When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks.
19. Backing removed, weld tabs removed and finished, and fillet welds added where required	**PERFORM**	
20. Repair activities	**PERFORM AND DOCUMENT**	
21. Document acceptance or rejection of welded joint or member	**PERFORM**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL – BOLTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION TASKS PRIOR TO BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-1		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Manufacture's certifications available for fastener materials	**PERFORM**	
2. Fasteners marked in accordance with ASTM requirements	OBSERVE	
3. Proper fasteners selected for joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	OBSERVE	
4. Proper bolting procedure selected for joint detail	OBSERVE	
5. Connecting elements, including appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	OBSERVE	
6. Proper storage provided for bolts, nuts, washers, and other fastener components	OBSERVE	
STEEL INSPECTION TASKS DURING BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
7. Fastener assemblies of suitable condition, placed in all holes and washers (if required) are positioned as required	OBSERVE	
8. Joint brought to the snug-tight condition prior to pretensioning operation	OBSERVE	
9. Fastener component not turned by the wrench prevented from rotating	OBSERVE	
10. Bolts are pretensioned in accordance with RCSC Specification, progressing systematically from the most rigid point toward the free edges	OBSERVE	
STEEL INSPECTION TASKS AFTER BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.1, AISC 360-10: Table C-N5.6-3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Document acceptance or rejection of all bolted connections	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL - NON DESTRUCTIVE TESTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Section N5.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Use of qualified nondestructive testing personnel	**PERFORM**	Visual weld inspection and nondestructive testing (NDT) shall be conducted by personnel qualified in accordance with AWS D1.8 clause 7.2
2. CJP groove welds	OBSERVE	**[NOTE: DOR must delete this row if section D (SEISMIC PROVISIONS SECTION) is checked]** Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 20% of CJP groove welds for materials greater than 5/16" (8mm) thick. Testing rate must be increased to 100% if greater than 5% of welds tested have unacceptable defects.
3. Welded joints subject to fatigue	OBSERVE	Dye penetrant testing (DT) and Ultrasonic testing (UT) shall be performed on 100% of welded joints identified on contract drawings as being subject to fatigue.
4. Weld tab removal sites	OBSERVE	At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

STRUCTURAL - STEEL – AISC 341 REQUIREMENTS (SEISMIC PROVISIONS) SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Section J6.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
[NOTE: DOR may uncheck this section for projects NOT designed in accordance with AISC 341 (Seismic Provisions) or for projects designed according to AISC 341, but using an R value equal to 3]		
5. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 100% of CJP groove welds for materials greater than 5/16" thick (8mm).
6. Beam cope and access hole.	OBSERVE	At welded splices and connections, thermally cut surfaces of beam copes and access holes shall be tested using magnetic particle testing (MT) or dye penetrant testing (DT), when the flange thickness exceeds 1 1/2 in. for rolled shapes, or when the web thickness exceeds 1 1/2 in. for built-up shapes.
7. K-area NDT (AISC 341)	**PERFORM**	Where welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3-inches of the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.
8. Placement of reinforcing or contouring fillet welds	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL - COMPOSITE CONSTRUCTION [1]

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

COMPOSITE CONSTRUCTION PRIOR TO PLACING CONCRETE – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table N6.1, AISC 341-16: Table J9.1		
TASK	INSPECTION TYPE [2]	DESCRIPTION
1. Placement and installation of steel headed stud anchors	**PERFORM**	
2. Material identification of reinforcing steel (Type/Grade)	OBSERVE	
3. Determination of carbon equivalent for reinforcing steel other than ASTM A706	OBSERVE	
4. Proper reinforcing steel size, spacing, clearances, support, and orientation	OBSERVE	
5. Reinforcing steel has not been re-bent in the field	OBSERVE	
6. Reinforcing clearances have been provided	OBSERVE	
7. Reinforcing steel has been tied and supported as required	OBSERVE	
8. Composite member has required size	OBSERVE	

END SECTION

STRUCTURAL - STEEL - OTHER INSPECTIONS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OTHER STEEL INSPECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Tables J8.1 & J10.1		
TASK	INSPECTION TYPE [2]	DESCRIPTION
1. Anchor rods and other embedments supporting structural steel	**PERFORM**	Verify the diameter, grade, type, and length of the anchor rod or embedded item, and the extent or depth of embedment prior to placement of concrete.
2. Fabricated steel or erected steel frame	OBSERVE	Verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.

[1] See Concrete Construction Section for all concrete related inspection of composite steel construction.

[2] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

3. Reduced beam sections (RBS) where/if occurs	**DOCUMENT**	✓ Contour and finish ✓ Dimensional tolerances
4. Protected zones	**DOCUMENT**	No holes or unapproved attachments made by fabricator or erector
5. H-piles where/if occurs	**DOCUMENT**	No holes or unapproved attachments made by the responsible contractor

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK - PLACEMENT SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION PRIOR TO DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.1		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness	**PERFORM**	
2. Document acceptance or rejection of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION DURING DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
3. Verify compliance of deck and all deck accessories installation with construction documents	**PERFORM**	
4. Verify deck materials are represented by the mill certifications that comply with the construction documents	**PERFORM**	
5. Document acceptance or rejection of installation of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION AFTER DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

6. Welding procedure specification (WPS) available	**PERFORM**	
7. Manufactures certifications for welding consumables available	OBSERVE	
8. Material identification (type/grade)	OBSERVE	
9. Check welding equipment	OBSERVE	

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.4		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Use of qualified welders	OBSERVE	
2. Control and handling of welding consumables	OBSERVE	
3. Environmental conditions (wind speed, moisture, temperature)	OBSERVE	
4. WPS followed	OBSERVE	
METAL DECK INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
5. Verify size and location of welds, including support, sidelap, and perimeter welds.	**PERFORM**	
6. Welds meet visual acceptance criteria	**PERFORM**	
7. Verify repair activities	**PERFORM**	
8. Document acceptance or rejection of welds	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - COLD-FORMED METAL DECK – FASTENING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION BEFORE MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Manufacturer installation instructions available for mechanical fasteners	OBSERVE	
2. Proper tools available for fastener installation	OBSERVE	
METAL DECK INSPECTION DURING MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
3. Fasteners are positioned as required	OBSERVE	
4. Fasteners are installed in accordance with manufacturer's instructions	OBSERVE	
METAL DECK INSPECTION AFTER MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.8		
TASK	INSPECTION TYPE [1]	DESCRIPTION
5. Check spacing, type, and installation of support fasteners	**PERFORM**	
6. Check spacing, type, and installation of sidelap fasteners	**PERFORM**	
7. Check spacing, type, and installation of perimeter fasteners	**PERFORM**	
8. Verify repair activities	**PERFORM**	
9. Document acceptance or rejection of mechanical fasteners	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - LIGHT GAUGE STEEL FRAMING AND/OR LIGHT GAUGE TRUSSES SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

LIGHT GAUGE STEEL CONSTRUCTION AND CONNECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.2, 1705.11.2, 1705.11.3, UFC 4 023 03		
TASK	INSPECTION TYPE[1]	DESCRIPTION
1. Trusses spanning 60-feet or greater where/if applies	**PERFORM**	Verify that temporary and permanent truss restraint/bracing is installed in accordance with approved truss submittal package.
2. Welded connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all welds composing part of the main wind or seismic force resisting system, including shearwalls, braces, collectors (drag struts), and hold-downs. **[NOTE: DOR must identify critical wind and/or seismic force resisting welds in the contract drawings so that the special inspector can confirm compliance.]**
3. Connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all screw attachment, bolting, anchoring and other fastening of components within the main wind or seismic force resisting system, including roof deck, roof framing, exterior wall covering, wall to roof/floor connections, braces, collectors (drag struts) and hold-downs. **[NOTE: DOR must identify critical wind and/or seismic force resisting connection/fastener components in the contract drawings so that the special inspector can confirm compliance.]**
4. Cold-formed steel (progressive collapse resisting system where/if applies)	OBSERVE	Verify proper welding operations, screw attachment, bolting, anchoring and other fastening of components within the progressive collapse resisting system, including horizontal tie force elements, vertical tie force elements and bridging elements (UFC 4 023 03). **[NOTE: DOR must identify critical progressive collapse resisting connection/fastener components in the contract drawings so that the special inspector can confirm compliance.]**

END SECTION

STRUCTURAL - OPEN-WEB STEEL JOISTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OPEN-WEB STEEL JOISTS AND JOIST GIRDERS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.2.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

1. Installation of open-web steel joists and joist girders	OBSERVE	✓ End connections – welded or bolted ✓ Bridging – horizontal and diagonal

END SECTION

STRUCTURAL - CONCRETE CONSTRUCTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect reinforcement, including prestressing tendons, and verify placement.	OBSERVE	Verify prior to placing concrete that reinforcing is of specified type, grade and size; that it is free of oil, dirt and unacceptable rust; that it is located and spaced properly; that hooks, bends, ties, stirrups and supplemental reinforcement are placed correctly; that lap lengths, stagger and offsets are provided; and that all mechanical connections are installed per the manufacturer's instructions and/or evaluation report.
2. Reinforcing bar welding	OBSERVE	✓ Verify weldability of reinforcing bars other than ASTM A 706 ✓ Inspect single-pass fillet welds, maximum 5/16" in accordance with AWS D1.4
3. All other welding	**CONTINUOUS**	Visually inspect all welds in accordance with AWS D1.4
4. Cast in place anchors and post installed drilled anchors (downward inclined)	OBSERVE	Verify prior to placing concrete that cast in place anchors and post installed drilled anchors have proper embedment, spacing and edge distance.
5. Post-installed adhesive anchors in horizontal or upward inclined orientations	**CONTINUOUS AND DOCUMENT**	✓ Inspect as required per approved ICC-ES report ✓ Verify that installer is certified for installation of horizontal and overhead installation applications ✓ Inspect proof loading as required by the contract documents
6. Verify use of required mix design	OBSERVE	Verify that all mixes used comply with the approved construction documents
7. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete	**CONTINUOUS**	At the time fresh concrete is sampled to fabricate specimens for strength test verify these tests are performed by qualified technicians.
8. Inspect concrete and/or shotcrete placement for proper application techniques	**CONTINUOUS**	Verify proper application techniques are used during concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.
9. Verify maintenance of specified curing temperature and technique	OBSERVE	Inspect curing, cold weather protection, and hot weather protection procedures.

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

10. Pre-stressed concrete	**CONTINUOUS**	Verify application of prestressing forces and grouting of bonded prestressing tendons.

CONTINUED ON FOLLOWING PAGE

STRUCTURAL - CONCRETE CONSTRUCTION (CONTINUED)

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Inspect erection of precast concrete members	OBSERVE	
12. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	OBSERVE	
13. Inspect formwork for shape, location and dimensions of the concrete member being formed.	OBSERVE	

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

STRUCTURAL - MASONRY CONSTRUCTION SECTION (ALL RISK CATEGORIES)

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE AT START OF CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Compliance with approved submittals prior to start	OBSERVE	
2. Proportions of site-mixed mortar.	OBSERVE	
3. Grade and type of reinforcement, anchor bolts, and prestressing tendons and anchorages	OBSERVE	
4. Prestressing technique	OBSERVE	
5. Properties of thin bed mortar for AAC masonry	OBSERVE	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE PRIOR TO GROUTING IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
6. Grout space	OBSERVE **CONTINUOUS**	**[NOTE: DOR must either delete 'OBSERVE' for Risk Category IV/V, or delete 'CONTINUOUS' for Risk Categories I/II/ III]**
7. Proportions of site-prepared grout and prestressing grout for bonded tendons	OBSERVE	
8. Proportions of site-mixed grout and prestressing grout for bonded tendons	OBSERVE	
9. Placement of masonry units and mortar joints	OBSERVE	
10. Welding of reinforcement	**CONTINUOUS**	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE DURING CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Size and location of structural elements is in compliance	OBSERVE	
12. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F (4.4°c) or hot weather (temp above 90°F (32.2°C))	OBSERVE	
13. Application and measurement of prestressing force	**CONTINUOUS**	
14. Placement of grout and prestressing grout for bonded tendons	**CONTINUOUS**	
15. Placement of AAC masonry units and construction of thin bed mortar joints	**CONTINUOUS**	Continuous for first 5000 square feet only (465 square meters).
16. Observe preparation of grout specimens, mortar specimens, and/or prisms	OBSERVE	
17. Type, size and placement of reinforcement, connectors, anchor bolts and prestressing tendons	OBSERVE **CONTINUOUS**	**[NOTE: DOR must either delete 'OBSERVE' for Risk Category**

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

and anchorages, including details of anchorage of masonry to structural members, frames, or other construction		**IV/V, or delete 'CONTINUOUS' for Risk Categories I/II/III]**

END SECTION

STRUCTURAL - WOOD CONSTRUCTION – SPECIALTY ITEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

WOOD CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. High-load diaphragms where applicable	OBSERVE	Verify thickness and grade of sheathing, size of framing members at panel edges, nail diameters and length, and the number of fastener lines and that fastener spacing is per approved contract documents.
2. Metal-plate connected wood trusses spanning 60 feet or greater	OBSERVE	Verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package

END SECTION

STRUCTURAL - WOOD CONSTRUCTION - SEISMIC & WIND SECTION

THIS SECTION IS APPLICABLE IF BOX IS CHECKED: ☒

WOOD CONSTRUCTION SEISMIC AND WIND – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.11 & 1705.12.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
[NOTE: DOR may uncheck this section where sheathing nailing/fasteners (both shearwall and roof) are consistently greater than 4" on center, or if the design wind speed (ASD) is less than 110 mph (49 meters/sec) AND the seismic design category is A or B]		
1. Nailing, bolting, anchoring and other fastening of elements of the main wind/seismic force-resisting system	OBSERVE (CONTINUOUS FOR GLUING)	Includes connectors for: shearwall sheathing, roof/floor sheathing, drag struts/collectors (double top plates), braces, hold downs, roof connections to exterior walls.

END SECTION

STRUCTURAL – ISOLATION AND ENERGY DISSIPATION SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

ISOLATION AND ENERGY DISSIPATION SYSTEMS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC TABLE 1705.12.8		
[NOTE: This section is not applicable to Seismic Design Category A. Uncheck this section if this category applies]		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Fabrication and installation	OBSERVE	Verify that fabrication and installation of isolator units and energy dissipation devices conform to manufacturer's recommendations and approved construction documents

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

2. Testing of seismic isolation Systems in seismically isolated structures		Seismic Isolation Systems in seismically isolated structures shall be tested accordance with ASCE 7, Section 17.8

END SECTION

GEOTECHNICAL - SOILS INSPECTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SOILS INSPECTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Materials below shallow foundations are adequate to achieve the design bearing capacity.	OBSERVE	
2. Excavations are extended to proper depth and have reached proper material	OBSERVE	
3. Perform classification and testing of compacted fill materials	**OBSERVE**	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	**CONTINUOUS**	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	OBSERVE	During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report

END SECTION

GEOTECHNICAL - DRIVEN DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

DEEP DRIVEN FOUNDATION CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify element materials, sizes and lengths comply with requirements	**CONTINUOUS**	
2. Inspect driving operations and maintain complete and accurate records for each element	**CONTINUOUS**	
3. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achiever design capacity, record tip and butt elevations and document any damage to foundation element	**CONTINUOUS**	
4. Determine capacities of test elements and conduct additional load tests if required.	**CONTINUOUS**	

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

5. For steel or concrete elements, perform additional special inspections in accordance with the Steel and Concrete sections in this schedule		

END SECTION

GEOTECHNICAL - HELICAL PILE FOUNDATIONS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

HELICAL PILE FOUNDATIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.9		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Record installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required. The approved geotechnical report and the contract documents shall be used to determine compliance	**CONTINUOUS**	

END SECTION

GEOTECHNICAL - CAST IN PLACE DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

CAST IN PLACE DEEP FOUNDATION ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.8		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	**CONTINUOUS**	For concrete elements, perform additional special inspections in accordance with the Concrete section in this schedule

END SECTION

[1] **CONTINUOUS:** Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

FIRE PROTECTION - SPRAYED FIRE-RESISTANT MATERIALS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SPRAYED FIRE RESISTANT MATERIALS (SFRM) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.14		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Substrate condition	OBSERVE	Prior to application, confirm that surfaces have been prepared according to the approved fire-resistance design and manufacturer's instructions.
2. Material thickness	OBSERVE	Verify SFRM thickness according to 2018 IBC 1705.14.4
3. Material density	OBSERVE	Verify SFRM density according to 2018 IBC 1705.14.5
4. Bond strength	OBSERVE	Verify bond strength of cured SFRM according to IBC 1705.14.6

END SECTION

FIRE PROTECTION - MASTIC AND INTUMESCENT COATINGS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.15		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect according to AWCI 12-B and the contract documents	OBSERVE	Inspections shall be performed in accordance with AWCI 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials.

END SECTION

FIRE PROTECTION – FIRE RESISTANT PENETRATIONS AND JOINTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

FIRE RESISTANT PENETRATIONS AND JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.17		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspections of penetration firestop systems conducted in accordance with ASTM E 2174.	OBSERVE	**[NOTE: This section applies to Risk Category III, IV, & V only. DOR may choose to uncheck this section where project is assigned to Risk Category I or II. Confirm Risk Category with Structural Engineer]**
2. Inspections of fire-resistant joint systems conducted in accordance with ASTM E 2393	OBSERVE	

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

FIRE PROTECTION – SMOKE CONTROL SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SMOKE CONTROL – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.18		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify device locations and perform leakage testing	OBSERVE	Perform during erection of ductwork and prior to concealment
2. Pressure difference testing, flow measurements and detection and control verification	OBSERVE	Perform prior to occupancy and after sufficient completion

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

ARCHITECTURAL - EXTERIOR INSULATION AND FINISH SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.16		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Water resistive barrier coating applied over a sheathing substrate.	OBSERVE	Verify that water resistive barrier coating complies with ASTM E 2570. **[NOTE: not applicable to masonry or concrete wall applications. Uncheck this section in those cases]**

END SECTION

ARCHITECTURAL – ARCHITECTURAL COMPONENTS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

ARCHITECTURAL COMPONENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.12.5, 1705.12.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
[NOTE: This section is not applicable to Seismic Design Categories A, B, & C. Uncheck this section if one of those categories applies. Confirm Seismic Design Category with the structural engineer]		
1. Erection and fastening of exterior cladding and interior and exterior veneer.	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if height is less than 30 feet or weight is less than 5psf**
2. Interior and exterior non-load bearing walls	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if interior non-load bearing walls weigh less than 15psf**
3. Access floors	OBSERVE	Verify that anchorage complies with approved construction documents.
4. Storage racks	OBSERVE	Verify that anchorage complies with approved construction documents. Inspection of post-installed anchors shall comply with approved ICC-ES report. **Inspector Note: Not required for racks less than 8 feet in height**

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

PLUMBING/MECHANICAL/ELECTRICAL DESIGNATED SEISMIC SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

PLUMBING, MECHANICAL AND ELECTRICAL IBC 1705.12.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
[NOTE: This section is not applicable to Seismic Design Categories A or B. Uncheck this section if one of those categories applies. Confirm Seismic Design Category with structural engineer]		
1. Anchorage of electrical equipment for emergency and standby power systems	OBSERVE	✓ Check for general conformance
2. Anchorage of all other electrical equipment in Seismic Design Categories E and F only (See first page of this schedule for Seismic Design Category)	OBSERVE	✓ Check for general conformance
3. Installation and anchorage of piping designed to carry hazardous materials and their associated mechanical units.	OBSERVE	✓ Check for general conformance
4. Installation and anchorage of vibration isolation systems where the construction documents require a nominal clearance of ¼" or less between support framing and restraint.	OBSERVE	✓ Check for general conformance
5. Verification of clearance between fire sprinkler piping and surrounding mechanical and electrical equipment, including ductwork, piping and their structural supports.	OBSERVE	✓ Check for minimum clearances noted in ASCE7 13.2.3 or a nominal clearance of not less than 3 inches

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

DESCRIPTION

This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

A. Fabricate from 50 Kg (110 pound) mat finish white paper.

B. Cut to 100 mm (4-inch) wide by 300 mm (12 inch) long size tag.

C. Punch 3 mm (1/8-inch) diameter hole centered on 100 mm (4-inch) dimension of tag. Edge of Hole spaced approximately 13 mm (1/2-inch) from one end on tag.

D. Reinforce hole on both sides with gummed cloth washer or other suitable material capable of preventing tie pulling through paper edge.

E. Ties: Steel wire 0.3 mm (0.0120-inch) thick, attach to tag with twist tie, leaving 150 mm (6-inch) long free ends.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install temporary signs attached to room door frame or room door knob, lever, or pull for doors on corridor openings.

B. Mark on signs with felt tip marker having approximately 3 mm (1/8-inch) wide stroke for clearly legible numbers or letters.

C. Identify room with numbers as designated on floor plans.

3.2 LOCATION

A. Install on doors that have room, corridor, and space numbers shown.

B. Doors that do not require signs are as follows:

1. Corridor barrier doors (cross-corridor) in corridor with same number.
2. Folding doors or partitions.
3. Toilet or bathroom doors within and between rooms.
4. Communicating doors in partitions between rooms with corridor entrance doors.
5. Closet doors within rooms.

C. Replace missing, damaged, or illegible signs.

---END---

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SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.

B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 7, Division 21, Division 22, Division 23, Division 26, and Division 28 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.

C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.

D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 7, Division 8, Division 21, Division 22, Division 23, Division 26, and Division 28 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.

E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA’s operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy

phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the VA’s operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

1.2 CONTRACTUAL RELATIONSHIPS

A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the COR as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.

B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA COR and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the COR and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the COR.

C. Whole Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication

and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and COR. Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and the Contractor.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the COR and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. In the event that any Commissioning Issues and suggested resolutions are deemed by the COR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or COR will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the COR of any issues that they deem to constitute a potential contract change prior to acting on these issues.
5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or COR, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 32.16.15 PROJECT SCHEDULES (SMALL PROJECTS – DESIGN/BID/BUILD)

C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

D. Section 21 08 00 COMMISSIONING OF FIRE PROTECTION SYSTEMS.

E. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.4 SUMMARY

A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

C. The commissioning activities have been developed to support the United States Green Building Council's (USGBC) LEED ™ rating program and to support delivery of project performance in accordance with the VA requirements developed for the project to support the following credits:

1. Commissioning activities and documentation for the LEED™ section on "Energy and Atmosphere" and the prerequisite of "Fundamental Building Systems Commissioning."
2. Commissioning activities and documentation for the LEED™ section on "Energy and Atmosphere" requirements for the "Enhanced Building System Commissioning" credit.
3. Activities and documentation for the LEED™ section on "Measurement and Verification" requirements for the Measurement and Verification credit.

D. The commissioning activities have been developed to support the Green Buildings Initiative's Green Globes rating program and to support delivery of project performance in accordance with the VA requirements developed for the project.

1.5 ACRONYMS

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction

List of Acronyms	
Acronym	Meaning
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)
COR	Contracting Officer's Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery
NCA	Department of Veterans Affairs National Cemetery Administration
NEBB	National Environmental Balancing Bureau
O&M	Operations & Maintenance
OPR	Owner's Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
TAB	Test Adjust and Balance
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management

List of Acronyms	
Acronym	Meaning
VACO	VA Central Office
VA PM	VA Project Manager
VA-COR	VA Contracting Officer's Representative
USGBC	United States Green Building Council

1.6 DEFINITIONS

Acceptance Phase Commissioning: Commissioning tasks executed after most construction has been completed, most Site Observations and Static Tests have been completed and Pre-Functional Testing has been completed and accepted. The main commissioning activities performed during this phase are verification that the installed systems are functional by conducting Systems Functional Performance tests and Owner Training.

Accuracy: The capability of an instrument to indicate the true value of a measured quantity.

Back Check: A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review

Basis of Design (BOD): The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

Benchmarks: Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

Building Information Modeling (BIM): Building Information Modeling is a parametric database which allows a building to be designed and constructed virtually in 3D, and provides reports both in 2D views and as schedules. This electronic information can be extracted and reused for pre-populating facility management CMMS systems. Building Systems Commissioning (BSC): NEBB acronym used to designate its commissioning program.

Calibrate: The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.

CCTV: Closed circuit Television. Normally used for security surveillance and alarm detections as part of a special electrical security system.

COBie: Construction Operations Building Information Exchange (COBie) is an electronic industry data format used to transfer information developed during design, construction, and commissioning into the Computer Maintenance Management Systems (CMMS) used to operate facilities. See the Whole Building Design Guide website for further information (http://www.wbdg.org/resources/cobie.php)

Commissionability: Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned

Commissioning Agent (CxA): The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.

Commissioning Checklists: Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

Commissioning Design Review: The commissioning design review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency, control systems' sequence of operations including building automation system features; commissioning specifications and the ability to functionally test the systems.

Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a

system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also - Commissioning Observation).

Commissioning Manager (CxM): A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.

Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)

Commissioning Plan: A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.

Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

Commissioning Report: The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.

Commissioning Representative (CxR): An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.

Commissioning Specifications: The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.

Commissioning Team: Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.

Construction Phase Commissioning: All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Contract Documents (CD): Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings,

specifications and all applicable contract modifications or supplements.

Construction Phase Commissioning (CPC): All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Coordination Drawings: Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel, ductwork, major piping and electrical conduit and show the elevations and locations of the above components.

Data Logging: The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.

Deferred System Test: Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.

Deficiency: See "Commissioning Issue".

Design Criteria: A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.

Design Intent: The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are utilized to provide a written record of these ideas, concepts and criteria.

Design Narrative: A written description of the proposed design solutions that satisfy the requirements of the OPR.

Design Phase Commissioning (DPC): All commissioning tasks executed during the design phase of the project.

Environmental Systems: Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and

dehumidification for the purpose of human comfort or process control of temperature and humidity.

Executive Summary: A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.

Functionality: This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.

Functional Test Procedure (FTP): A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

Industry Accepted Best Practice: A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.

Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

Issues Log: A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the Commissioning Team during the course of the Commissioning Process.

Lessons Learned Workshop: A workshop conducted to discuss and document project successes and identify opportunities for improvements for future projects.

Maintainability: A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.

Manual Test: Testing using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

Owner's Project Requirements (OPR): A written document that details the project requirements and the expectations of how the building and its systems will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Peer Review: A formal in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning review. The VA usually hires an independent third-party (called the IDIQ A/E) to conduct peer reviews.

Precision: The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

Pre-Design Phase Commissioning: Commissioning tasks performed prior to the commencement of design activities that includes project programming and the development of the commissioning process for the project

Pre-Functional Checklist (PFC): A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.

Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

Procedure or Protocol: A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.

Range: The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.

Resolution: This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.

Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.

Special System Inspections: Inspections required by a local code authority prior to occupancy and are not normally a part of the commissioning process.

Static Tests: Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.

Start Up Tests: Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.

Systems Manual: A system-focused composite document that includes all information required for the owners operators to operate the systems.

Test Procedure: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

Testing: The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.

Testing, Adjusting, and Balancing (TAB): A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are

described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

Thermal Scans: Thermographic pictures taken with an Infrared Thermographic Camera. Thermographic pictures show the relative temperatures of objects and surfaces and are used to identify leaks, thermal bridging, thermal intrusion, electrical overload conditions, moisture containment, and insulation failure.

Training Plan: A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.

Trending: Monitoring over a period of time with the building automation system.

Unresolved Commissioning Issue: Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. Validation: The process by which work is verified as complete and operating correctly:

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner’s Project Requirements.

Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes follow-up on verification of system performance, measurement and verification tasks and assistance in identifying

warranty issues and enforcing warranty provisions of the construction contract.

Warranty Visit: A commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

Whole Building Commissioning: Commissioning of building systems such as Building Envelope, HVAC, Electrical, Special Electrical (Fire Alarm, Security & Communications), Plumbing and Fire Protection as described in this specification.

1.7 SYSTEMS TO BE COMMISSIONED

A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.

B. The following systems will be commissioned as part of this project:

Systems To Be Commissioned	
System	**Description**
Elevators	Interface with other systems (fire alarm, etc.) [ASTM testing and certification by others]
Table Notes	
** Denotes systems that LEED requires to be commissioned to comply with the LEED Fundamental Commissioning pre-requisite.	

1.8 COMMISSIONING TEAM

A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by Contractor:

1. Contractor' Commissioning Manager: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
2. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she

represents, explicitly organized to implement the commissioning process through coordinated actions.

C. Members Appointed by VA:
   1. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. The VA will engage the CxA under a separate contract.
   2. User: Representatives of the facility user and operation and maintenance personnel.
   3. A/E: Representative of the Architect and engineering design professionals.

1.9 VA'S COMMISSIONING RESPONSIBILITIES

A. Appoint an individual, company or firm to act as the Commissioning Agent.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
   1. Coordination meetings.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Testing meetings.
   4. Witness and assist in Systems Functional Performance Testing.
   5. Demonstration of operation of systems, subsystems, and equipment.

C. Provide the Construction Documents, prepared by Architect and approved by VA, to the Commissioning Agent and for use in managing the commissioning process, developing the commissioning plan, systems manuals, and reviewing the operation and maintenance training plan.

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.

B. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.

C. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform

commissioning team activities including, but not limited to, the following:

1. Participate in commissioning coordination meetings.
2. Conduct operation and maintenance training sessions in accordance with approved training plans.
3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
5. Review and comment on commissioning documentation.
6. Participate in meetings to coordinate Systems Functional Performance Testing.
7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
8. Provide information to the Commissioning Agent for developing commissioning plan.
9. Participate in training sessions for VA's operation and maintenance personnel.
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.

C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on

performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.

D. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.

E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.

F. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.

G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.

H. Coordinate Systems Functional Performance Testing schedule with the Contractor.

I. Witness selected systems startups.

J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.

K. Witness and document Systems Functional Performance Testing.

L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00 GENERAL REQUIREMENTS.

N. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.

O. Prepare commissioning Field Observation Reports.

P. Prepare the Final Commissioning Report.

Q. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

R. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

1.12 COMMISSIONING DOCUMENTATION

A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
3. Identification of systems and equipment to be commissioned.
4. Schedule of Commissioning Coordination meetings.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training.
9. Schedule for commissioning activities with dates coordinated with overall construction schedule.

10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
12. Preliminary Systems Functional Performance Test procedures.

B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.

F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.

1. Creating a Commissioning Issues Log Entry:
   a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
   b. Assign a descriptive title for the issue.
   c. Identify date and time of the issue.
   d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
   e. Identify system, subsystem, and equipment to which the issue applies.
   f. Identify location of system, subsystem, and equipment.
   g. Include information that may be helpful in diagnosing or evaluating the issue.

h. Note recommended corrective action.
i. Identify commissioning team member responsible for corrective action.
j. Identify expected date of correction.
k. Identify person that identified the issue.

2. Documenting Issue Resolution:
a. Log date correction is completed or the issue is resolved.
b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
c. Identify changes to the Contract Documents that may require action.
d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
e. Identify person(s) who corrected or resolved the issue.
f. Identify person(s) verifying the issue resolution.

G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
2. Commissioning plan.
3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.

4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
5. Commissioning Issues Log.
6. Listing of deferred and off-season test(s) not performed, including the schedule for their completion.

H. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:

1. Documentation of deferred and off-season test(s) results.
2. Completed Systems Functional Performance Test Procedures for off season test(s).
3. Documentation that unresolved system performance issues have been resolved.
4. Updated Commissioning Issues Log, including status of unresolved issues.
5. Identification of potential Warranty Claims to be corrected by the Contractor.

I. Systems Manual: The Commissioning Agent will gather required information and compile the Systems Manual. The Systems Manual will include, but is not limited to, the following:

1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
2. Reference to Final Commissioning Plan.
3. Reference to Final Commissioning Report.
4. Approved Operation and Maintenance Data as submitted by the Contractor.

1.13 SUBMITTALS

A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary

Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:

1. The Commissioning Team: A list of commissioning team members by organization.
2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).
3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system’s testing.

B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor’s project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The

Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.

C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.

D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.

E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.

F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA COR with copies to the Contractor and Architect.

G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.

H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.

I. Data for Commissioning:

1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

1.14 COMMISSIONING PROCESS

A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.

B. Within 30 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.

C. Within 60 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

1.15 QUALITY ASSURANCE

A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.16 COORDINATION

A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will

submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.

C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.

D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.

F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing will be identified in the detailed System Functional Performance Test Procedure prepared by the Commissioning Agent.

B. Data logging equipment and software required to test equipment shall be provided by the Contractor.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 °C (1.0 °F) and a resolution of + or - 0.1 °C (0.2 °F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

A. The following table outlines the roles and responsibilities for the Commissioning Team members during the Construction Phase:

Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Construction Commissioning Kick Off meeting	L	A	P	P	O	
	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Controls Meeting	L	A	P	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support the OPR and BOD.	L	A	P	P	N/A	
Cx Plan & Spec	Final Commissioning Plan	L	A	R	R	O	
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	

Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	L	A	R	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	L	A	R	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Status Reports	L	A	R	R	O	

Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Reports and Logs	Maintain Commissioning Issues Log	L	A	R	R	O	

B. The following table outlines the roles and responsibilities for the Commissioning Team members during the Acceptance Phase:

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Pre-Test Coordination Meeting	L	A	P	P	O	
	Lessons Learned and Commissioning Report Review Meeting	L	A	P	P	O	

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	L	P	P	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Review Operations & Maintenance Manuals	L	A	R	R	R	
	Training Plan Review	L	A	R	R	R	
	Warranty Review	L	A	R	R	O	
	Review TAB Report	L	A	R	R	O	
Site Observations	Construction Observation Site Visits	L	A	R	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	S	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

C. The following table outlines the roles and responsibilities for the Commissioning Team members during the Warranty Phase:

Warranty Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Post-Occupancy User Review Meeting	L	A	O	P	P	
Site Observations	Periodic Site Visits	L	A	O	O	P	
Functional Test Protocols	Deferred and/or seasonal Testing	L	A	O	P	P	
Technical Activities	Issues Resolution Meetings	L	S	O	O	P	
	Post-Occupancy Warranty Checkup and review of Significant Outstanding Issues	L	A		R	P	
Reports and Logs	Final Commissioning Report Amendment	L	A		R	R	
	Status Reports	L	A		R	R	

3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
   a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
   b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.
2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
   a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
   b. The full startup plan shall at a minimum consist of the following items:
      1) The Pre-Functional Checklists.
      2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
      3) The manufacturer's normally used field checkout sheets.

c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.

3. Sensor and Actuator Calibration
   a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 specifications.
   b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
4. Execution of Equipment Startup
   a. Four weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
   b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
   c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
   d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.

B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.

C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

3.4 PHASED COMMISSIONING

A. The project may require startup and initial checkout to be executed in phases. This phasing shall be planned and scheduled in a coordination meeting of the VA, Commissioning Agent, and the Contractor. Results will be added to the master construction schedule and the commissioning schedule.

3.5 DDC SYSTEM TRENDING FOR COMMISSIONING

A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.

B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.

1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
2. Priority level alarms are to be printed to a printer which is connected to the Operator’s Work Station located within the engineer’s office. Additionally, Priority level alarms will be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from

the operator or maintenance personnel within a normal work shift, and not immediate action.

3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.

D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the COR and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the COR. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the COR, prior to the execution of Systems Functional Performance Testing.

2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
OA Temperature	AI	15 Min	24 hours	3 days	N/A		
RA Temperature	AI	15 Min	24 hours	3 days	N/A		

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
RA Humidity	AI	15 Min	24 hours	3 days	P	>60% RH	10 min
Mixed Air Temp	AI	None	None	None	N/A		
SA Temp	AI	15 Min	24 hours	3 days	C	±5°F from SP	10 min
Supply Fan Speed	AI	15 Min	24 hours	3 days	N/A		
Return Fan Speed	AI	15 Min	24 hours	3 days	N/A		
RA Pre-Filter Status	AI	None	None	None	N/A		
OA Pre-Filter Status	AI	None	None	None	N/A		
After Filter Status	AI	None	None	None	N/A		
SA Flow	AI	15 Min	24 hours	3 days	C	±10% from SP	10 min
OA Supply Temp	AI	15 Min	24 hours	3 days	P	±5°F from SP	10 min
RA Supply Temp	AI	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
RA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
Initial UVC Intensity (%)	AI	None	None	None	N/A		
Duct Pressure	AI	15 Min	24 hours	3 days	C	±25% from SP	6 min
CO2 Level	AI	15 Min	24 hours	3 days	P	±10% from SP	10 min
Supply Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Return Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 Min
High Static Status	DI	COV	24 hours	3 days	P	True	1 min

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Fire Alarm Status	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 1	DI	COV	24 hours	3 days	C	True	10 min
Freeze Stat Level 2	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 3	DI	COV	24 hours	3 days	P	True	1 min
Fire/Smoke Damper Status	DI	COV	24 hours	3 days	P	Closed	1 min
Emergency AHU Shutdown	DI	COV	24 hours	3 days	P	True	1 min
Exhaust Fan #1 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #2 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #3 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
OA Alarm	DI	COV	24 hours	3 days	C	True	10 min
High Static Alarm	DI	COV	24 hours	3 days	C	True	10 min
UVC Emitter Alarm	DI	COV	24 hours	3 days	P	True	10 min
CO2 Alarm	DI	COV	24 hours	3 days	P	True	10 min
Power Failure	DI	COV	24 hours	3 days	P	True	1 min
Supply Fan Speed	AO	15 Min	24 hours	3 days	N/A		
Return Fan Speed	AO	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AO	15 Min	24 hours	3 days	N/A		
Supply Fan S/S	DO	COV	24 hours	3 days	N/A		
Return Fan S/S	DO	COV	24 hours	3 days	N/A		
Fire/Smoke Dampers	DO	COV	24 hours	3 days	N/A		

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
AHU Energy	Calc	1 Hour	30 day	N/A	N/A		

Terminal Unit (VAV, CAV, etc.) Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Space Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Air Flow	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Local Setpoint	AI	15 Min	12 hours	3 days	M	±10°F from SP	60 min
Space Humidity	AI	15 Min	12 hours	3 days	P	> 60% RH	5 min
Unoccupied Override	DI	COV	12 hours	3 days	M	N/A	12 Hours
Refrigerator Alarm	DI	COV	12 hours	3 days	C	N/A	10 min
Damper Position	AO	15 Minutes	12 hours	3 days	N/A		
Heating coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		

4-Pipe Fan Coil Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
Pre-Filter Status	AI	None	None	None	M	> SP	1 hour
Water Sensor	DI	COV	12 hours	3 days	M	N/A	30 Min
Cooling Coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Heating coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Fan Coil ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

2-Pipe Fan Coil Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
Pre-Filter Status	AI	None	None	None	M	> SP	1 hour
Water Sensor	DI	COV	12 hours	3 days	M	N/A	30 Min
Cooling Coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Fan Coil ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

Unit Heater Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5˚F from SP	10 min
Heating Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Unit Heater ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

Steam and Condensate Pumps Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Steam Flow (LB/HR)	AI	15 Minutes	12 hours	3 days	N/A		
Condensate Pump Run Hours	AI	15 Minutes	12 hours	3 days	N/A		
Water Meter (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
Electric Meter (KW/H)	AI	15 Minutes	12 hours	3 days	N/A		
Irrigation Meter (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
Chilled Water Flow (TONS)	AI	15 Minutes	12 hours	3 days	N/A		
Condensate Flow (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
High Water Level Alarm	DI	COV	12 hours	3 days	C	True	5 Min
Condensate Pump Start/Stop	DO	COV	12 hours	3 days	P	Status <> Command	10 min

Domestic Hot Water Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Domestic HW Setpoint WH-1	AI	15 Minute	12 Hours	3 days	N/A		
Domestic HW Setpoint WH-2	AI	15 Minute	12 Hours	3 days	N/A		
Domestic HW Temperature	AI	15 Minute	12 Hours	3 days	C	> 135 oF	10 Min
Domestic HW Temperature	AI	15 Minute	12 Hours	3 days	P	±5°F from SP	10 Min
Dom. Circ. Pump #1 Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Dom. Circ. Pump #2 Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Dom. Circ. Pump #1 Start/Stop	DO	COV	12 Hours	3 days	N/A		
Dom. Circ. Pump #2 Start/Stop	DO	COV	12 Hours	3 days	N/A		
Domestic HW Start/Stop	DO	COV	12 Hours	3 days	N/A		

Hydronic Hot Water Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
System HWS Temperature	AI	15 min	12 hours	3 days	C	±5°F from SP	10 Min
System HWR Temperature	AI	15 min	12 hours	3 days	M	±15°F from SP	300 Min
HX-1 Entering Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
HX-2 Entering Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
HX-2 Leaving Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
System Flow (GPM)	AI	15 min	12 hours	3 days	N/A		

Hydronic Hot Water Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
System Differential Pressure	AI	15 min	12 hours	3 days	P	±10% from SP	8 Min
				3 days			
HW Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
HW Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
HW Pump 1 VFD Speed	AO	15 Min	12 Hours	3 days	N/A		
HW Pump 2 VFD Speed	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #1 1/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #1 2/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #2 1/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #2 2/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station Bypass Valve Position	AO	15 Min	12 Hours	3 days	N/A		
HW Pump 1 Start/Stop	DO	COV	12 Hours	3 days	N/A		
HW Pump 2 Start/Stop	DO	COV	12 Hours	3 days	N/A		
HWR #1 Valve	DO	COV	12 Hours	3 days	N/A		
HWR #2 Valve	DO	COV	12 Hours	3 days	N/A		

Chilled Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Chiller 1 Entering Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Leaving Temperature	AI	15 Minutes	12 Hours	3 days	P	±5°F from SP	10 Min
Chiller 1 Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Percent Load	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 KW Consumption	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Entering Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Leaving Temperature	AI	15 Minutes	12 Hours	3 days	P	±5°F from SP	10 Min
Chiller 2 Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Percent Load	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 KW Consumption	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Decoupler Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Supply Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Differential Pressure	AI	15 Minutes	12 Hours	3 days	P	±5% from SP	10 Min
Secondary Loop Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Supply Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Return Temperature	AI	15 Minutes	12 Hours	3 days	N/A		

Chilled Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Secondary Loop Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Primary Loop Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Secondary Loop Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Secondary Loop Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 1 Evaporator Iso-Valve	DI	COV	12 Hours	3 days	N/A		
Chiller 1 Evaporator Flow Switch	DI	COV	12 Hours	3 days	N/A		
Chiller 1 Unit Alarm	DI	COV	12 Hours	3 days	C	True	10 Min
Chiller 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 2 Evaporator Iso-Valve	DI	COV	12 Hours	3 days	N/A		
Chiller 2 Evaporator Flow Switch	DI	COV	12 Hours	3 days	N/A		
Chiller 2 Unit Alarm	DI	COV	12 Hours	3 days	C	True	10 Min
Refrigerant Detector	DI	COV	12 Hours	3 days	C	True	10 Min
Refrigerant Exhaust Fan Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Emergency Shutdown	DI	COV	12 Hours	3 days	P	True	1 Min
Primary Loop Pump 1 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		

Chilled Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Primary Loop Pump 2 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Pump 1 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Pump 2 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Primary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Primary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Chiller 1 Enable	DO	COV	12 Hours	3 days	N/A		
Chiller 1 Iso-Valve Command	DO	COV	12 Hours	3 days	N/A		
Chiller 2 Enable	DO	COV	12 Hours	3 days	N/A		
Chiller 2 Iso-Valve Command	DO	COV	12 Hours	3 days	N/A		
Refrigerant Exhaust Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		

Condenser Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Chiller 1 Condenser Entering Temp	AI	15 Minutes	12 Hours	3 days	N/A		

Condenser Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Chiller 1 Condenser Leaving Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser Entering Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser Leaving Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Basin Temp	AI	15 Minutes	12 Hours	3 days	P	< 45 oF	10 Min
Cooling Tower 2 Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Basin Temp	AI	15 Minutes	12 Hours	3 days	P	< 45 oF	10 Min
Condenser Water Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Condenser Water Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Outdoor Air Wet Bulb	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Cooling Tower 1 Basin Heat	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 1 Heat Trace	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Cooling Tower 2 Basin Heat	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Heat Trace	DI	COV	12 Hours	3 days	N/A		
Chiller 1 Isolation Valve	DI	COV	12 Hours	3 days	P	Status <> Command	1 min

Condenser Water System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Chiller 2 Isolation Valve	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Condenser Water Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Condenser Water Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Chiller 1 Condenser Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser By-Pass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		
Condenser Water Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Condenser Water Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		

Steam Boiler System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Boiler 1 Steam Pressure	AI	15 Minutes	12 Hours	3 days	P	±5% from SP	10 Min
Boiler 1 Steam Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Steam Pressure	AI	15 Minutes	12 Hours	3 days	P	±5% from SP	10 Min
Boiler 2 Steam Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
System Steam Pressure	AI	15 Minutes	12 Hours	3 days	P	±5% from SP	10 Min
Boiler 1 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 1 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Boiler 1 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Low Water Alarm	DI	COV	12 Hours	3 days	C	True	5 Min
Boiler 1 High Water Alarm	DI	COV	12 Hours	3 days	C	True	5 Min
Boiler 1 Feed Pump	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 2 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Boiler 2 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Low Water Alarm	DI	COV	12 Hours	3 days	C	True	5 Min
Boiler 2 High Water Alarm	DI	COV	12 Hours	3 days	C	True	5 Min

Steam Boiler System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Boiler 2 Feed Pump	DI	COV	12 Hours	3 days	N/A		
Combustion Damper Status	DI	COV	12 Hours	3 days	P	Status <> Command	5 min
Condensate Recovery Pump Status	DI	COV	12 Hours	3 days	P	Status <> Command	5 min
Boiler 1 Feed Pump Start / Stop	DO	COV	12 Hours	3 days	N/A		
Boiler 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Combustion Damper Command	DO	COV	12 Hours	3 days	N/A		
Condensate Recovery Pump Start / Stop	DO	COV	12 Hours	3 days	N/A		

Hot Water Boiler System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Outside Air Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Entering Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Leaving Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Entering Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Leaving Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		

Hot Water Boiler System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Hot Water Supply Temperature	AI	15 Minutes	12 Hours	3 days	P	±5 oF from SP	10 Min
Hot Water Return Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Differential Pressure	AI	15 Minutes	12 Hours	3 days	C	±5% from SP	10 Min
Lead Boiler	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 1 Isolation Valve	DI	COV	12 Hours	3 days	N/A		
Boiler 1 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Boiler 2 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 2 Isolation Valve	DI	COV	12 Hours	3 days	N/A		
Boiler 2 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Combustion Dampers Open	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Secondary Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min

Hot Water Boiler System Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Secondary Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 1 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Primary Pump 2 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Hot Water System Enable	DO	COV	12 Hours	3 days	N/A		
Combustion Dampers Command	DO	COV	12 Hours	3 days	N/A		
Primary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Primary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the COR and Commissioning Agent.
   1. Point-to-Point checkout documentation;
   2. Sensor field calibration documentation including system name, sensor/point name, measured value, DDC value, and Correction Factor.
   3. A sensor calibration table listing the referencing the location of procedures to following in the O&M manuals, and the frequency at which calibration should be performed for all sensors, separated by

system, subsystem, and type. The calibration requirements shall be submitted both in the O&M manuals and separately in a standalone document containing all sensors for inclusion in the commissioning documentation. The following table is a sample that can be used as a template for submission.

SYSTEM		
Sensor	**Calibration Frequency**	**O&M Calibration Procedure Reference**
Discharge air temperature	Once a year	Volume I Section D.3.aa
Discharge static pressure	Every 6 months	Volume II Section A.1.c

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.

AIR HANDLING UNIT AHU-1				
Control Reference	Proportional Constant	Integral Constant	Derivative Constant	Interval
Heating Valve Output	1000	20	10	2 sec.

3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.

B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response.

The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.

D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms developed by the Commissioning Agent will include, but not be limited to, the following information:

1. System and equipment or component name(s)
2. Equipment location and ID number
3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment
4. Date
5. Project name
6. Participating parties

7. A copy of the specification section describing the test requirements
8. A copy of the specific sequence of operations or other specified parameters being verified
9. Formulas used in any calculations
10. Required pretest field measurements
11. Instructions for setting up the test.
12. Special cautions, alarm limits, etc.
13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
15. A section for comments.
16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.

E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.

1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.
5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.

G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.

H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be

considered a justified reason for a claim of delay or for a time extension by the Contractor.

I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.

B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
   a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor’s response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.
   b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
   a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor’s response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.

b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.
c. The Commissioning Agent will document the resolution process.
d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:
1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the VA. The Commissioning Agent will evaluate each test and report to the VA using a standard form. The VA will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

3.8 DEFERRED TESTING

A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.

B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent will review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent.

Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent will convene a training preparation conference to include VA's COR, VA's Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.

B. The Contractor shall provide training and demonstration as required by other Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 sections. The Training and Demonstration shall include, but is not limited to, the following:

1. Review the Contract Documents.
2. Review installed systems, subsystems, and equipment.
3. Review instructor qualifications.
4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Review and discuss locations and other facilities required for instruction.
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:

1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.

2. Qualification Data: Submit qualifications for facilitator and/or instructor.
3. Attendance Record: For each training module, submit list of participants and length of instruction time.
4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
5. Demonstration and Training Recording:
   a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
   b. Video Format: Provide high quality color DVD color on standard size DVD disks.
   c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
   d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   e. Submit two copies within seven days of end of each training module.
6. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

D. Quality Assurance:
1. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

2. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
3. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

E. Training Coordination:
1. Coordinate instruction schedule with VA's operations. Adjust schedule as required to minimize disrupting VA's operations.
2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the VA.

F. Instruction Program:
1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
a. Fire protection systems, including fire alarm, fire pumps, and fire suppression systems.
b. Intrusion detection systems.
c. Conveying systems, including elevators, wheelchair lifts, escalators, and automated materials handling systems.
d. Medical equipment, including medical gas equipment and piping.
e. Laboratory equipment, including laboratory air and vacuum equipment and piping.
f. Heat generation, including boilers, feedwater equipment, pumps, steam distribution piping, condensate return systems, heating hot water heat exchangers, and heating hot water distribution piping.
g. Refrigeration systems, including chillers, cooling towers, condensers, pumps, and distribution piping.
h. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.
i. HVAC instrumentation and controls.

j. Electrical service and distribution, including switchgear, transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
k. Packaged engine generators, including synchronizing switchgear/switchboards, and transfer switches.
l. Lighting equipment and controls.
m. Communication systems, including intercommunication, surveillance, nurse call systems, public address, mass evacuation, voice and data, and entertainment television equipment.
n. Site utilities including lift stations, condensate pumping and return systems, and storm water pumping systems.

G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participants are expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project Record Documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.

b. Repair instructions.

c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

H. Training Execution:

1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.

2. Instruction:

a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.

b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2) The VA will furnish an instructor to describe VA's operational philosophy.

3) The VA will furnish the Contractor with names and positions of participants.

3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.

4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.
5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

I. Demonstration and Training Recording:

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
2. Video Format: Provide high quality color DVD color on standard size DVD disks.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

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SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies demolition and removal of buildings, portions of buildings, utilities, other structures and debris from trash dumps shown.

1.2 RELATED WORK:

A. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.

B. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.

C. Asbestos Removal: Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT.

1.3 PROTECTION:

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, 1.9 Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.

E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

No wall or part of wall shall be permitted to fall outwardly from structures.

1. Maintain at least one stairway in each structure in usable condition to highest remaining floor. Keep stairway free of obstructions and debris until that level of structure has been removed.
2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.

F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the USACE. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have USACE's approval.

G. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

1.4 UTILITY SERVICES:

A. Demolish and remove outside utility service lines shown to be removed.

B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DEMOLITION:

A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
   1. As required for installation of new utility service lines.
   2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.

B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the USACE. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

C. In removing buildings and structures of more than two stories, demolish work story by story starting at highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.

D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.

E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the USACE. When Utility lines are encountered that are not indicated on the drawings, the USACE shall be notified prior to further work in that area.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to USACE. Clean-up shall include off the Medical Center disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

---END---

SECTION 02 41 19
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site

1.4 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, which indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of selective demolition activities with starting and ending dates for each activity.

C. Predemolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will temporarily relocate the following items:

a. All moveable medical equipment
b. Any items that Owner feels need to be temporarily relocated

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or

unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch as per Division 1 Safety requirements

5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly. Comply with Division 1 requirements.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

- - - END - - -

SECTION 02 82 13.13
GLOVEBAG ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 SUMMARY OF THE WORK

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be completed under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Asbestos Abatement Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict shall be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Asbestos Abatement Contractor. All costs incurred due to such action are also the responsibility of the Asbestos Abatement Contractor.

1.1.2 EXTENT OF WORK

A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated by the glovebag method. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section shall be interpreted as limiting the extent of work otherwise required by this contract and related documents.

1.1.3 RELATED WORK

A. Section 07 84 00, FIRESTOPPING.
B. Section 02 41 19, SELECTIVE DEMOLITION.
C. Division 09, FINISHES.
D. Division 22, PLUMBING.
E. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING
F. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION
G. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION
H Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.
I. Section 23 31 00, HVAC DUCTS AND CASINGS
J. Section 23 37 00, AIR OUTLETS AND INLETS

1.1.4 TASKS

The work tasks are summarized as follows:
A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site

preparations, emergency procedures arrangements, and Asbestos Hazard Abatement Plans for glovebag asbestos abatement work.

B. Abatement activities including removal, clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.

C. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

A. The Contractor and Contractor's personnel shall cooperate fully with the COR/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.

B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved VA Design and Construction Procedures. VA Design and Construction Procedures drawings of partially occupied buildings shall show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the COR through the pre-abatement plan of action. The following limitations of use shall apply to existing facilities shown on drawings:

1.2 VARIATIONS IN QUANTITY

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimated, which are limited by the physical constraints imposed by occupancy of the buildings and accessibility to ACM. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the contractor shall provide unit prices for newly discovered ACM and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

If the Contracting Officer; their field representative; (the facility Safety Officer/Manager or their designee, or the VA Professional Industrial Hygienist/ Certified Industrial Hygienist (VPIH/CIH) presents a verbal **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed ACM. If a verbal Stop Asbestos Removal Order is issued, the VA shall follow-up with a written order to the Contractor as soon as it is practicable. The Contractor shall not resume any asbestos removal activity until authorized to do so in writing by the VA Contracting Officer Representative (COR). A stop asbestos removal order shall be issued at any time the VA Contracting Officer Representative (COR) determines abatement conditions/activities are not within VA specification, regulatory requirements or that an imminent hazard exists to human health or the environment. Work stoppage shall continue

until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions shall be borne by the Contractor, including the VPIH/CIH time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person to the VA Contracting Office Representative using the most expeditious means (e.g., verbal, or telephonic), followed up with written notification to the Contracting Officer as soon as practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

A. Airborne PCM analysis results equal to or greater than 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area.
B. breach or break in regulated area containment barrier(s).
C. less than -0.02" WCG pressure in the regulated area.
D. severe injury/death at the site.
E. fire/safety emergency at the site.
F. respiratory protection system failure.
G. power failure or loss of wetting agent; or
H. any visible emissions observed outside the regulated area.

1.4 DEFINITIONS

1.4.1 GENERAL

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Drawings shall be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

1.4.2 GLOSSARY

Abatement - Procedures to control fiber release from asbestos-containing materials. Includes removal, encapsulation, enclosure, demolition, and renovation activities related to asbestos containing materials (ACM).
Aerosol - Solid or liquid particulate suspended in air.
Adequately wet - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.
Aggressive method - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.
Aggressive sampling - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.
AHERA - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.
Aircell - Pipe or duct insulation made of corrugated cardboard which contains asbestos.
Air monitoring - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air. For personal samples and clearance air testing using Phase Contrast Microscopy (PCM) analysis. NIOSH Method 7402 can be used when it is necessary to confirm fibers counted by PCM as being asbestos. The AHERA TEM analysis shall be used for background, area samples and clearance

samples when required by this specification, or at the discretion of the VPIH/CIH as appropriate.

Air sample filter - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

Amended water - Water to which a surfactant (wetting agent) has been added to increase the penetrating ability of the liquid.

Asbestos - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

Asbestos Hazard Abatement Plan (AHAP) - Asbestos work procedures required to be submitted by the contractor before work begins.

Asbestos-containing material (ACM) - Any material containing more than one percent of asbestos.

Asbestos contaminated elements (ACE) - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

Asbestos-contaminated soil (ACS) - Soil found in the work area or in adjacent areas such as crawlspaces or pipe tunnels which is contaminated with asbestos-containing material debris and cannot be easily separated from the material.

Asbestos-containing waste (ACW) material - Asbestos-containing material or asbestos contaminated objects requiring disposal.

Asbestos Project Monitor - Some states require that any person conducting asbestos abatement clearance inspections and clearance air sampling be licensed as an asbestos project monitor.

Asbestos waste decontamination facility - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it shall be used to evacuate personnel.

Authorized person - Any person authorized by the VA, the Contractor, or government agency and required by work duties to be present in regulated areas.

Authorized visitor - Any person approved by the VA; the contractor; or any government agency representative having jurisdiction over the regulated area (e.g., OSHA, Federal and State EPA).

Barrier - Any surface that isolates the regulated area and inhibits fiber migration from the regulated area.

Containment Barrier - An airtight barrier consisting of walls, floors, and/or ceilings of sealed plastic sheeting which surrounds and seals the outer perimeter of the regulated area.

Critical Barrier - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting secured in place at openings such as doors, windows, or any other opening into the regulated area.

Primary Barrier - Plastic barriers placed over critical barriers and exposed directly to abatement work.

Secondary Barrier - Any additional plastic barriers used to isolate and provide protection from debris during abatement work.

Breathing zone - The hemisphere forward of the shoulders with a radius of about 150 - 225 mm (6 - 9 inches) from the worker's nose.

Bridging encapsulant - An encapsulant that forms a layer on the surface of the ACM.

Building/facility owner - The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which asbestos activities take place.
Bulk testing - The collection and analysis of suspect asbestos containing materials.
Certified Industrial Hygienist (CIH) - A person certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.
Class I asbestos work - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).
Class II asbestos work - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing, and siding shingles, and construction mastic.
Clean room/Changing room - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.
Clearance sample - The final air sample taken after all asbestos work has been done and visually inspected. Performed by the VA's professional industrial hygiene consultant/Certified Industrial Hygienist (VPIH/CIH).
Closely resemble - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.
Competent person - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.
Contractor's Professional Industrial Hygienist (CPIH/CIH) - The asbestos abatement contractor's industrial hygienist. The industrial hygienist shall meet the qualification requirements of a PIH and shall be a certified industrial hygienist (CIH).
Count - Refers to the fiber count or the average number of fibers greater than five microns in length with a length-to-width (aspect) ratio of at least 3 to 1, per cubic centimeter of air.
Crawlspace – An area which can be found either in or adjacent to the work area. This area has limited access and egress and shall contain asbestos materials and/or asbestos contaminated soil.
Decontamination area/unit - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.
Demolition - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.
VA Total – means a building or substantial part of the building is completely removed, torn, or knocked down, bulldozed, flattened, or razed, including removal of building debris.
Disposal bag - Typically 6 mil thick sift-proof, dustproof, leak-tight container used to package and transport asbestos waste from regulated

areas to the approved landfill. Each bag/container shall be labeled/marked in accordance with EPA, OSHA, and DOT requirements.

Disturbance - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag, in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag and shall not exceed 60 inches in length or width.

Drum - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be sift-proof, dustproof, and leak-tight.

Employee exposure - The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

Encapsulant - A material that surrounds or embeds asbestos fibers in an adhesive matrix and prevents the release of fibers.

Encapsulation - Treating ACM with an encapsulant.

Enclosure - The construction of an airtight, impermeable, permanent barrier around ACM to control the release of asbestos fibers from the material and also eliminate access to the material.

Equipment room - A contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

Fiber - A particulate form of asbestos, 5 microns or longer, with a length to width (aspect) ratio of at least 3 to 1.

Fibers per cubic centimeter (f/cc) - Abbreviation for fibers per cubic centimeter, used to describe the level of asbestos fibers in air.

Filter - Media used in respirators, vacuums, or other machines to remove particulate from air.

Firestopping - Material used to close the open parts of a structure in order to prevent a fire from spreading.

Friable asbestos containing material - Any material containing more than one (1) percent or asbestos as determined using the method specified in appendix A, Subpart F, 40 CFR 763, section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Glovebag - Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools shall be handled.

High efficiency particulate air (HEPA) filter – An ASHRAE MERV 17 filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

HEPA vacuum - Vacuum collection equipment equipped with a HEPA filter system capable of collecting and retaining asbestos fibers.

Homogeneous area – An area of surfacing, thermal system insulation or miscellaneous ACM that is uniform in color, texture, and date of application.

HVAC - Heating, Ventilation and Air Conditioning

Industrial hygienist (IH) - A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).

Industrial hygienist technician (IH Technician) - A person working under the direction of an IH or CIH who has special training, experience, certifications, and licenses required for the industrial hygiene work

assigned. Some states require that an industrial hygienist technician conducting asbestos abatement clearance inspection and clearance air sampling be licensed as an asbestos project monitor.

Intact - The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

Lockdown - Applying encapsulant, after a final visual inspection, on all abated surfaces at the conclusion of ACM removal prior to removal of critical barriers.

National Emission Standards for Hazardous Air Pollutants (NESHAP) - EPA's rule to control emissions of asbestos to the environment (40 CFR Part 61, Subpart M).

Negative initial exposure assessment - A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL.

Negative pressure - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through HEPA equipped filtration units. OSHA requires maintaining -0.02" water column gauge inside the negative pressure enclosure.

Negative pressure respirator - A respirator in which the air pressure inside the facepiece is negative during inhalation relative to the air pressure outside the respirator facepiece.

Non-friable ACM - Material that contains more than 1 percent asbestos but cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Organic vapor cartridge - The type of cartridge used on air purifying respirators to remove organic vapor hazardous air contaminants.

Outside air - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

Owner/operator - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Penetrating encapsulant - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

Personal protective equipment (PPE) - equipment designed to protect user from injury and/or specific job hazard. Such equipment shall include protective clothing, hard hats, safety glasses, and respirators.

Personal sampling/monitoring - Representative air samples obtained in the breathing zone for one or more workers within the regulated area using a filter cassette and a calibrated air sampling pump to determine asbestos exposure.

Permissible exposure limit (PEL) - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the eight (8) hour time weighted average PEL is 0.1 fibers per cubic centimeter (0.1 f/cc) of air and the 30-minute Excursion Limit is 1.0 fibers per cubic centimeter (1 f/cc).

Pipe tunnel - An area, typically located adjacent to mechanical spaces or boiler rooms in which the pipes servicing the heating system in the building are routed to allow the pipes to access heating elements. These areas shall contain asbestos pipe insulation, asbestos fittings, or asbestos-contaminated soil.

Polarized light microscopy (PLM) - Light microscopy using dispersion staining techniques and refractive indices to identify and quantify the type(s) of asbestos present in a bulk sample.
Polyethylene sheeting - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, flame retardant per NFPA 241.
Positive/negative fit check - A method of verifying the seal of a facepiece respirator by temporarily occluding the filters and breathing in (inhaling) and then temporarily occluding the exhalation valve and breathing out (exhaling) while checking for inward or outward leakage of the respirator respectively.
Presumed ACM (PACM) - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge or should have known through the exercise of due diligence that other materials are ACM, they too shall be treated as PACM. The designation of PACM shall be rebutted pursuant to 29 CFR 1926.1101 (b).
Professional IH - An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH. The PIH shall be either the VA's PIH (VPIH) of Contractor's PIH (CPIH/CIH).
Project designer - A person who has successfully completed the training requirements for an asbestos abatement project designer as required by 40 CFR 763 Appendix C, Part I: (B)(5).
Assigned Protection factor - A value assigned by OSHA/NIOSH to indicate the expected protection provided by each respirator class when the respirator is properly selected and worn correctly. The number indicates the reduction of exposure level from outside to inside the respirator facepiece.
Qualitative fit test (QLFT) - A fit test using a challenge material that can be sensed by the wearer if leakage in the respirator occurs.
Quantitative fit test (QNFT) - A fit test using a challenge material which is quantified outside and inside the respirator thus allowing the determination of the actual fit factor.
Regulated area - An area established by the employer to demarcate where Class I, II, III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work shall accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they shall exceed the PEL.
Regulated ACM (RACM) - Friable ACM; Category I non-friable ACM that has become friable; Category I non-friable ACM that shall be or has been subjected to sanding, grinding, cutting, or abrading or; Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.
Removal - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.
Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

Repair - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.
Shower room - The portion of the PDF where personnel shower before leaving the regulated area.
Supplied air respirator (SAR) - A respiratory protection system that supplies minimum Grade D respirable air per ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.
Surfacing ACM - A material containing more than 1 percent asbestos that is sprayed, troweled on, or otherwise applied to surfaces for acoustical, fireproofing and other purposes.
Surfactant - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.
Thermal system ACM - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.
Transmission electron microscopy (TEM) - A microscopy method that can identify and count asbestos fibers.
VA Professional Industrial Hygienist (VPIH/CIH) - The Department of Veterans Affairs Professional Industrial Hygienist shall meet the qualifications of a PIH and shall be a Certified Industrial Hygienist (CIH).
Contracting Officer Representative (COR) - The VA official responsible for on-going project work.
Visible emissions - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM/ACS or ACM waste material.
Waste/Equipment decontamination facility (W/EDF) – The area in which equipment is decontaminated before removal from the regulated area.
Waste generator - Any owner or operator whose act or process produces asbestos-containing waste material.
Waste shipment record - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.
Wet cleaning - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

1.4.3 REFERENCED STANDARDS ORGANIZATIONS

The following acronyms or abbreviations as referenced in contract/ specification documents are defined to mean the associated names. Names and addresses shall be subject to change.

A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420

B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888

C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300

D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400

E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420

F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900

G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420

H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949

I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420

I. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000

K. NEC National Electrical Code (by NFPA)

L. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037

M. NFPA National Fire Protection Association
1 Battery March Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

N. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

O. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402

P. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

1.5 APPLICABLE CODES AND REGULATIONS

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and shall have the same force and effect as this specification.
B. The most recent edition of any relevant regulation, standard, document, or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
C. Copies of all standards, regulations, codes, and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY

The Asbestos Abatement Contractor (Contractor) shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the asbestos abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection including respirator fit testing, as required by applicable Federal, State and Local regulations. The Contractor shall hold the VA and VPIH/CIH consultants harmless for any Contractor’s failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The Contractor shall incur all costs of the CPIH/CIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements related to failure to comply with the regulations applicable to the work.

1.5.3 FEDERAL REQUIREMENTS

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

A. Occupational Safety and Health Administration **(OSHA)**
1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
2. Title 29 CFR 1910 Subpart I - Personal Protective Equipment
3. Title 29 CFR 1910.134 - Respiratory Protection
4. Title 29 CFR 1926 - Construction Industry Standards
5. Title 29 CFR 1910.1020 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication
7. Title 29 CFR 1910 Subpart K - Medical and First Aid

B. Environmental Protection Agency **(EPA)**
1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.

2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)

C. Department of Transportation **(DOT)**
Title 49 CFR 100 - 185 – Transportation

1.5.4 STATE REQUIREMENTS:

State requirements that apply to the asbestos abatement work, disposal, clearance, etc… include, but are not limited to, the following:

1.5.5 LOCAL REQUIREMENTS

If local requirements are more stringent than federal or state standards, the local standards shall be followed.

1.5.6 STANDARDS

A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
   1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems and ANSI Z88.2 - Practices for Respiratory Protection.
   2. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.

B. Standards which govern encapsulation work include, but are not limited to, the following:
   1. American Society for Testing and Materials (ASTM)

C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
   1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
   2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
   3. NFPA 101 - Life Safety Code

1.5.7 EPA GUIDANCE DOCUMENTS

A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.

B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024

C. Asbestos Waste Management Guidance EPA 530-SW-85-007.

D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001

E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

1.5.8 NOTICES

A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:

B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification are given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

1.5.10 POSTING AND FILING OF REGULATIONS

Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers shall have daily access to the regulations and keep another copy in the Contractor's office.

1.5.11 VA RESPONSIBILITIES

Prior to commencement of work:

A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements shall be made prior to starting work for relocation of desks, files, equipment, and personal possessions to avoid unauthorized access into the regulated area. Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.
B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized, calibration data and method of analysis. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS

A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a); (b).
B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, shall read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that shall affect response capabilities.
D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
   1. For non-life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
   2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker,

remove them from the regulated area, and secure proper medical treatment.

F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that shall require the modification of the Asbestos Hazard Abatement Plans during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

1.5.14 PRE-CONSTRUCTION MEETING

Prior to commencing the work, the Contractor shall meet with the VPCIH to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who shall be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

A. Proof of Contractor licensing.
B. Proof the Competent Person is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person shall also be presented.
C. A list of all workers who shall participate in the project, including experience and verification of training and accreditation.
D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift shall have adequate training.
E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
F. Current fit tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
G. A copy of the Contractor's Asbestos Hazard Abatement Plan. In these procedures, the following information shall be detailed, specific for this project. A copy of the Contractor's Asbestos Hazard Abatement Plan (AHAP) for Class I Glovebag Asbestos Abatement. In these procedures, the following information shall be detailed, specific for this project.
   1. Regulated area preparation procedures.
   2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d).
   3. If required, decontamination area set-up/layout and decontamination procedures for employees.
   4. Glovebag abatement methods/procedures and equipment to be used; and
   5. Personal protective equipment to be used.
H. At this meeting, the Contractor shall provide all submittals as required.
I. Procedures for handling, packaging, and disposal of asbestos waste.
J. Emergency Action Plan and Contingency Plan Procedures.

1.6 PROJECT COORDINATION

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

1.6.1 PERSONNEL

A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard, Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.

B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the COR. A request for approval shall be submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.

C. Minimum qualifications for Contractor and assigned personnel are:
   1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of federal (and state as applicable) EPA and OSHA asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work as required by the state; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive Asbestos Hazard Abatement Plans (AHAPs) for asbestos work; and has adequate materials, equipment and supplies to perform the work.
   2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project within the past three (3) years; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
   3. The Contractor Professional Industrial Hygienist/CIH (CPIH/CIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete Asbestos Hazard Abatement Plan for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course or equivalent, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
   4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the Asbestos Hazard

Abatement Plans of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

All personnel should be in compliance with OSHA construction safety training as applicable and submit certification.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

The Contractor shall develop and implement a written Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998, OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910 Subpart I;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used shall be NIOSH approved for asbestos abatement activities. The written RPP shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1) (i - ix) - Respiratory Protection Program.

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

The Respiratory Protection Program Coordinator (RPPC) shall be identified and shall have two(2) years' experience coordinating RPP of similar size and complexity. The RPPC shall submit a signed statement attesting to the fact that the program meets the above requirements.

1.7.3 SELECTION AND USE OF RESPIRATORS

The procedure for the selection and use of respirators shall be submitted to the VA as part of the Contractor's qualifications. The procedure shall be written clearly enough for workers to understand. A copy of the Respiratory Protection Program shall be available in the clean room of the decontamination unit for reference by employees or authorized visitors.

1.7.4 MINIMUM RESPIRATORY PROTECTION

Minimum respiratory protection shall be a full face powered air purifying respirator when fiber levels are maintained consistently at or below 0.5 f/cc. A higher level of respiratory protection shall be provided or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel shall have a respirator for their exclusive use.

1.7.5 MEDICAL WRITTEN OPINION

No employee shall be allowed to wear a respirator unless a physician or other licensed health care professional has provided a written determination, they are medically qualified to wear the class of respirator to be used on the project while wearing whole body impermeable garments and subjected to heat or cold stress.

1.7.6 RESPIRATOR FIT TEST

All personnel wearing respirators shall have a current quantitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Fit tests shall be done for PAPR's which have been put into a failure mode.

1.7.7 RESPIRATOR FIT CHECK

The Competent Person shall assure that the positive/negative pressure user seal check is done each time the respirator is donned by an employee. Head coverings shall cover respirator head straps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a user seal check shall preclude that person from wearing a respirator inside the regulated area until resolution of the problem.

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1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

The Respiratory Protection Program Coordinator shall submit evidence and documentation showing compliance with 29 CFR 1910.134 (h) maintenance and care of respirators.

1.8 WORKER PROTECTION

1.8.1 TRAINING OF ABATEMENT PERSONNEL

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training shall include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof shall be submitted for each person working at the site.

1.8.2 MEDICAL EXAMINATIONS

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

Provide whole body clothing, head coverings, foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

1.8.4 REGULATED AREA ENTRY PROCEDURE

The Competent Person shall ensure that each time workers enter the regulated area; they remove ALL street clothes in the clean room of the decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

1.8.5 DECONTAMINATION PROCEDURE

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care shall be taken to follow reasonable procedures in removing the respirator to avoid inhaling asbestos fibers while showering. The following procedure is required as a minimum:
   1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
   2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
   3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**
D. Shower and wash body completely with soap and water. Rinse thoroughly.
E. Rinse shower room walls and floor to drain prior to exiting.
F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

1.8.6 REGULATED AREA REQUIREMENTS

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for Class I glovebag regulated areas at 29 CFR 1926.1101 (e) are met. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator.

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

1.9.2 GENERAL REQUIREMENTS

All personnel entering or exiting a regulated area shall go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials shall exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and W/EDF shall be constructed of a minimum of 3 layers of 6 mil opaque fire-retardant polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors so that they overlap and secure to adjacent surfaces. Weight inner doorway sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting and reduce potential for non-authorized personnel entering the regulated area.

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention shall be provided at the point of connection to the VA system. Water supply shall be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead electric power with ground fault circuit interruption (GFCI) protection. Provide a sub-panel equipped with GFCI protection for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50 foot candles in the PDF and W/EDF. Provide temporary heat, if needed, to maintain 70˚F throughout the PDF and W/EDF.

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

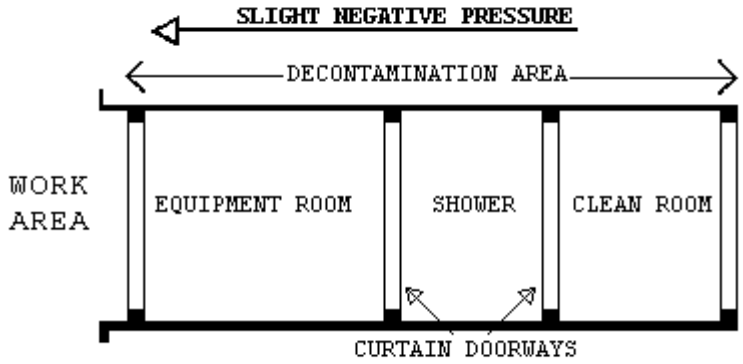
The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room. The PDF shall be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

1. Clean Room: The clean room shall be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire-retardant poly to provide an airtight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil

poly opaque fire-retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide one storage locker per person. A portable fire extinguisher, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.

2. Shower Room: The Competent Person shall assure that the shower room is a completely watertight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using airtight walls made from at least 3 layers of 6 mil opaque fire- retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Wastewater shall be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters shall be changed a minimum of once per day or more often as needed. Filter changes shall be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
3. Equipment Room: The Competent Person shall provide an equipment room which shall be an airtight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room, and the rest of the building by airtight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire-retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.

4. The PDF shall be as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF shall be a minimum of 2 layers of 6 mil opaque fire-retardant poly.

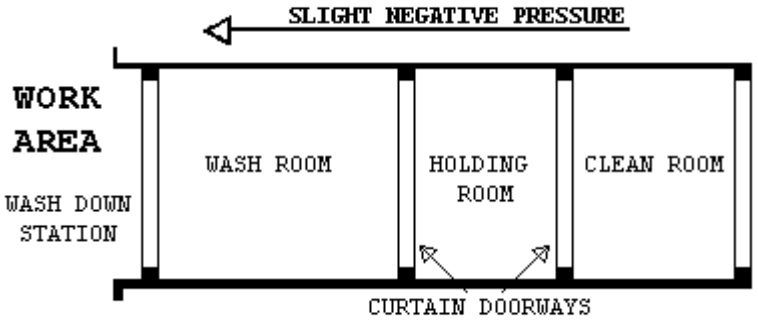


1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

The Competent Person shall provide a W/EDF consisting of a washroom, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Washroom as an equipment bag and container cleaning station.
2. Washroom: Provide a washroom for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the washroom using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the washroom so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the washroom shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the washroom. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the washroom to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.

5. The W/EDF shall be as follows: Washroom leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

At the washdown station in the regulated area, thoroughly wet wipe/clean contaminated equipment and/or sealed polyethylene bags and pass into Washroom after visual inspection. When passing anything into the Washroom, close all doorways of the W/EDF, other than the doorway between the washdown station and the Washroom. Keep all outside personnel clear of the W/EDF. Once inside the Washroom, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel shall not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Washroom.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

2.1 MATERIALS AND EQUIPMENT

2.1.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)

Prior to the start of work, the contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project. Work shall not start unless the following items have been delivered to the site and the CPIH/CIH has submitted verification to the VA's representative.

A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable and combustible materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized location.

D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used, shall be removed from the worksite, and disposed of properly.
E. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mils. For floors and all other uses, sheeting of at least 6-mils shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment shall include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and wastewater filtration system shall be provided by the Contractor.
I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.
J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).
K. Disposal bags – 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
L. The VA shall be provided an advance copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-project submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.
M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued shall be based on a written hazard assessment conducted under 29 CFR 1910.132(d).

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces in the regulated area shall be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated,

immediately stop work, and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

A. Place all tools, scaffolding, materials, and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with 2 layers of 6-mil fire retardant poly sheeting and secure with duct tape. Lock out and tag out any HVAC systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

A. Access to the regulated area is allowed only through the personnel decontamination facility (PDF), if required. All other means of access shall be eliminated, and OSHA Danger demarcation signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of 6 mil opaque fire-retardant poly sheeting to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier shall be solid.

2.2.4 CRITICAL BARRIERS

A. Completely separate any openings into the regulated area from adjacent areas using fire retardant poly at least 6 mils thick and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects in the regulated area. Heat shall be shut off any objects covered with poly.

2.2.5 SECONDARY BARRIERS

A. A loose layer of six mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the glovebag abatement. This layer shall be replaced as needed during the work.

2.2.6 EXTENSION OF THE REGULATED AREA

A. If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. If the affected area cannot be added to the regulated area, decontamination measures shall be started immediately and continue until air monitoring indicates background levels are met.

2.2.7 FIRESTOPPING

A. Through penetrations caused by cables, cable trays, pipes, sleeves shall be fire-stopped with a fire-rated firestop system providing an air tight seal.
B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the COR. The Contractor shall list

all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the COR immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the COR or Fire Marshall.

C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the COR for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

2.3 MONITORING, INSPECTION AND TESTING

2.3.1 GENERAL

A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the Employee exposure to asbestos shall not exceed 0.1 fibers per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.

B. The VA shall employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH shall perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors shall not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services shall be borne by the VA except for any repeat of final inspection and testing that shall be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, shall be paid for by the Contractor.

C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor shall request confirmation of the results by analysis of the samples by TEM. Request shall be in writing and submitted to the VA's representative. Cost for the confirmation of results shall be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis shall be the responsibility of the CPIH/CIH with review and approval of the VPIH/CIH. An agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection,

quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

A. The purpose of the work of the VPIH/CIH is to: Assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH shall perform the following tasks:
   1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
   2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
   3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits shall include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
   4. Task 4: Provide support to the COR such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc…
   5. Task 5: Perform, in the presence of the COR, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
   6. Task 6: Issue certificate of decontamination for each regulated area or building and project report.

B. All data, inspection results and testing results generated by the VPIH/CIH shall be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.

C. The monitoring and inspection results of the VPIH/CIH shall be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

2.3.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR CPIH/CIH

The Contractor’s CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor’s personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide

documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor (or Abatement Worker) and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the COR and the VPIH/CIH upon request. The log shall contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH shall perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH shall monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

The Contractor shall have established Asbestos Hazard Abatement Plan (AHAP) in printed form and loose-leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and clearly explain the ways and procedures to be followed during all phases of the work by the Contractor's personnel. The AHAP shall be modified as needed to address specific requirements of the project. The AHAP shall be submitted for review and approval prior to the start of any abatement work. The minimum topics and areas to be covered by the AHAP(s) are:

A. Minimum Personnel Qualifications
B. Contingency Plans and Arrangements
C. Security and Safety Procedures
D. Respiratory Protection/Personal Protective Equipment Program and Training
E. Medical Surveillance Program and Recordkeeping
F. Regulated Area Requirements for Glovebag Abatement
G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
H. Monitoring, Inspections, and Testing
I. Removal Procedures for Piping ACM Using the Glovebag Method
J. Disposal of ACM waste
K. Regulated Area Decontamination/Clean-up
L. Regulated Area Visual and Air Clearance
M. Project Completion/Closeout

2.5 SUBMITTALS

2.5.1 PRE-START MEETING SUBMITTALS

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project:

A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
B. Submit a staff organization chart showing all personnel who shall be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed, and dated by the CPIH/CIH.
D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
   1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
   2. Wastewater filtration system, shower system, containment barriers.
   3. Encapsulants, surfactants, handheld sprayers, airless sprayers, glovebags, and fire extinguishers.
   4. Respirators, protective clothing, personal protective equipment.
   5. Fire safety equipment to be used in the regulated area.
E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring shall be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.
H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
   1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date
   2. List project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; and Resolution.

3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.

I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
   1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.
   2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
   3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.

J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and Asbestos Hazard Abatement Plans; copies of monitoring results of the five referenced projects listed and analytical method(s) used.

K. Rented equipment shall be decontaminated prior to returning to the rental agency.

L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS, and application instructions.

2.5.2 SUBMITTALS DURING ABATEMENT

A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment

failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWAs/ELs. Submit this information daily to the VPIH/CIH.

B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
   1. Removal of any poly barriers.
   2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
   3. Packaging and removal of ACM waste from regulated area.
   4. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the COR on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

The CPIH/CIH shall submit a project report consisting of the daily logbook requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It shall also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed, and dated by the CPIH/CIH, in accordance with Attachment #1. All clearance and perimeter area samples shall be submitted. The COR shall retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

A. The following four types of encapsulants shall comply with comply with performance requirements as stated in paragraph 2.6.2:
   1. Removal encapsulant - used as a wetting agent to remove ACM.
   2. Bridging encapsulant - provides a tough, durable coating on ACM.
   3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
   4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

2.6.2 PERFORMANCE REQUIREMENTS

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

A. General Requirements for all Encapsulants:
   1. ASTM E84: Flame spread of 25; smoke emission of 50.
   2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
   3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
   4. ASTM E96: Permeability - minimum of 0.4 perms.

B. Bridging/Penetrating Encapsulants:
   1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft^2).
   2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
   3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).

4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.

C. Lockdown Encapsulants:
1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft^2) (test compatibility with cementitious and fibrous fireproofing).
3. In certain situations, encapsulants shall have to be applied to hot pipes/equipment. The encapsulant shall be able to withstand high temperatures without cracking or off gassing any noxious vapors during application.

2.7 CERTIFICATES OF COMPLIANCE

The Contractor shall submit to the COR certification from the manufacturer indicating compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

2.8 RECYCLABLE PROTECTIVE CLOTHING

If recyclable clothing is provided, all requirements of EPA, DOT and OSHA shall be met.

PART 3 – EXECUTION

3.1 REGULATED AREA PREPARATIONS

3.1.1 SITE SECURITY

A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These shall include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.

B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer Representative using the most expeditious means.

C. A logbook shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area shall record their name, affiliation, time in, and time out for each entry.

D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways,) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which shall result in a flame hazard, fire retardant poly sheeting shall be used.

E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress

and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.

F. The Contractor shall have the VA's assistance in notifying adjacent personnel of the presence, location, and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.

G. The regulated area shall be locked during non-working hours and secured by the COR or Competent Person. The VA Police should be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

3.1.2 OSHA DANGER SIGNS

Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos shall exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs shall be posted following construction of the regulated area enclosure.

3.1.3.1 SHUT DOWN - LOCK OUT ELECTRICAL

Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Ensure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.1.3.2 SHUT DOWN - LOCK OUT HVAC

Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil poly disposal bags for disposal as asbestos waste.

3.1.4 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

3.1.4.1 GENERAL

Seal off any openings at the perimeter of the regulated area with critical barriers to completely isolate the regulated area and to contain all airborne asbestos contamination created by the abatement activities. Should the adjacent area past the regulated area become contaminated due to improper work activities, the Contractor shall suspend work inside the regulated area, continue wetting, and clean the adjacent areas in accordance with procedures described in these specifications. Any and all costs associated with the adjacent area cleanup shall not be borne by the VA.

3.1.4.2 PREPARATION PRIOR TO SEALING OFF

Place all materials, equipment and supplies necessary to isolate the regulated area inside the regulated area. Remove all movable material/equipment as described above and secure all unmovable material/equipment as described above. Properly secured material/ equipment shall be considered to be outside the regulated area.

3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA

Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of access shall be eliminated, and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to, or within view of an occupied area, provide a visual barrier of 6 mil opaque fire-retardant poly to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier shall be solid and capable of withstanding the negative pressure.

3.1.4.4 CRITICAL BARRIERS

The regulated area shall be completely separated from the adjacent area(s) and the outside by at least 2 layers of 6 mil fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly and taped securely in place with duct tape/spray adhesive. Critical barriers shall remain in place until all work and clearances have been completed. Light fixtures shall not be operational during abatement. Auxiliary lighting shall be provided. If needed, provide plywood squares 6" x 6" x 3/8" (150mm x 150mm x 18mm) held in place with one 6d smooth masonry/galvanized nail driven through the center of the plywood square and duct tape on the poly so as to clamp the poly to the wall/surface. Locate plywood squares at each end, corner, and 4' (1200mm) maximum on centers.

3.1.4.5 EXTENSION OF THE REGULATED AREA

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion shall indicate background levels.

3.1.4.6 FLOOR BARRIERS:

All floors within ten feet of glovebag work shall be covered with 2 layers of 6 mil fire retardant poly.

3.1.5 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.1.6 PRE-CLEANING

3.1.6.1 PRE-CLEANING MOVABLE OBJECTS

The VA shall provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. PPE shall be donned by all workers performing pre-cleaning activities. After items have been pre-cleaned and decontaminated, they shall be removed from the work area for storage until the completion of abatement in the work area.

Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location.

3.1.6.2 PRE-CLEANING FIXED OBJECTS

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention shall be paid to machinery behind grills or gratings where access shall be difficult, but contamination shall be significant. Pay particular attention to the wall, floor, and ceiling penetration behind fixed items. After pre-cleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which shall remain in the regulated area and that require special ventilation or enclosure requirements should be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.

3.1.6.3 PRE-CLEANING SURFACES IN THE REGULATED AREA

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

3.1.7 PRE-ABATEMENT ACTIVITIES

3.1.7.1 PRE-ABATEMENT MEETING

The COR, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH/CIH that all

materials and equipment required for the project are on the site, shall arrange for a pre-abatement meeting between the Contractor, the CPIH/CIH, Competent Person(s), the COR(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials, or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative shall issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

3.1.7.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

Before any work begins on the construction of the regulated area, the Contractor will:

A. Conduct a space-by-space inspection with an authorized COR and prepare a written inventory of all existing damage in those spaces where asbestos abatement shall occur. Still or video photography shall be used to supplement the written damage inventory. Document shall be signed and certified as accurate by both parties.
B. The COR, the Contractor, and the VPIH/CIH shall be aware of AEQA 10-95 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially critical when demolition is planned, because AHERA surveys are non-destructive, and ACM shall remain undetected. A NESHAPS (destructive) ACM inspection should be conducted on all building structures that shall be demolished. Ensure the following areas are inspected on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets; behind radiators; lab fume hoods; transite lab countertops; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawl spaces(previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; and steam line trench coverings.
C. Ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects required to be removed from the regulated area have been cleaned and removed or properly protected from contamination.
D. If present and required, remove, and dispose of carpeting from floors in the regulated area.
E. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.7.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
B. Upon completion of all preparatory work, the CPIH/CIH shall inspect the work and systems and shall notify the VA's representative when the work

is completed in accordance with this specification. The VA's representative shall inspect the regulated area and the systems with the VPIH/CIH and shall require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved AHAP(s), especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.

C. The CPIH/CIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative shall notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification.

3.2 REMOVAL OF PIPING ACM

3.2.1 WETTING MATERIALS

A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and OSHA’s “wet methods” for the duration of the project. A removal encapsulant shall be used instead of amended water with written approval of the VA's representative.
B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture shall be equal to or greater than the wetting provided by water amended by a surfactant consisting of one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during disturbance equal to or greater than the amended water described above in B.

3.2.2 SECONDARY BARRIER AND WALKWAYS

A. Install as a drop cloth a 6 mil poly sheet at the beginning of each work shift where removal is to be done during that shift. Completely cover floors and any walls within 10 feet (3 meters) of the area where work is to be done. Secure the secondary barrier with duct tape to prevent it from moving or debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
B. Install walkways using 6 mil black poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the primary layers from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

3.2.3 WET REMOVAL OF ACM

A. Using acceptable glovebag procedures, adequately and thoroughly wet the ACM to be removed prior to removal with amended water or when authorized by VA, removal encapsulant to reduce/prevent fiber release to the air. Adequate time (at a minimum two hours) shall be allowed for the amended water or removal encapsulant to saturate the ACM. Abatement

personnel shall not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material shall be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants shall be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except when authorized in writing by the VPIH/CIH and VA when a greater safety hazard (e.g., electricity) is present**

3.3 GLOVEBAG REMOVAL PROCEDURES

3.3.1 GENERAL

All applicable OSHA requirements and glovebag manufacturer's recommendations shall be met during glove bagging operations. In cases where live steam lines are present, the lines shall be shut down prior to any work being performed on the system. **No abatement work shall be conducted on live, pressurized steam lines.** The Contractor shall choose to use a High Temperature Glovebag in which a temperature rating ranges from 300˚F to 700˚F on steam lines that have recently been shut down and remain at high temperature for some time. In the case where a glovebag is not feasible, the Contractor shall need to build a full negative pressure containment of sufficient size and follow all regulations as it pertains to removal.

1. Mix the surfactant with water in the garden sprayer, following the manufacturer's directions.
2. Have each employee put on a HEPA filtered respirator approved for asbestos and check the fit using the positive/negative fit check.
3. Have each employee put on a disposable full-body suit. Remember, the hood goes over the respirator straps.
4. Check closely the integrity of the glove bag to be used. Check all seams, gloves, sleeves, and glove openings. OSHA requires the bottom of the bag to be seamless.
5. Check the pipe where the work shall be performed. If it is damaged (broken lagging, hanging and so forth), wrap the entire length of the pipe in poly sheeting and "candy stripe" it with duct tape.
6. Attach glovebag with required tools per manufacturer's instructions.
7. Using the smoke tube and aspirator bulb, test 10% of glovebags by placing the tube into the water porthole (two-inch opening to glove bag) and fill the bag with smoke and squeeze it. If leaks are found, they should be taped closed using duct tape and the bag should be retested with smoke.
8. Insert the wand from the water sprayer through the water porthole.
9. Insert the hose end from a HEPA vacuum into the upper portion of the glove bag.
10. Wet and remove the pipe insulation.
11. If the section of pipe is covered with an aluminum jacket, remove it first using the wire cutters to cut any bands and the tin snips to remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when placing it in the bottom.
12. When the work is complete, spray the upper portion of the bag and clean-push all residue into the bottom of the bag with the other waste material. Be very thorough. Use adequate water.

13. Put all tools, after washing them off in the bag, in one of the sleeves of glove bag and turn it inside out, drawing it outside of the bag. Twist the sleeve tightly several times to seal it and tape it several tight turns with duct tape. Cut through the middle of the duct tape and remove the sleeve. Put the sleeve in the next glove bag or put it in a bucket of water to decontaminate the tools after cutting the sleeve open.
14. Turn on the HEPA vacuum and collapse the bag completely. Remove the vacuum nozzle, seal the hole with duct tape, twist the bag tightly several times in the middle, and tape it to keep the material in the bottom during removal of the glove bag from the pipe.
15. Slip a disposal bag over the glove bag (still attached to the pipe). Remove the tape securing the ends and slit open the top of the glove bag and carefully fold it down into the disposal bag. Double bag and gooseneck waste materials.

3.3.2 NEGATIVE PRESSURE GLOVEBAG PROCEDURE

1. In addition to the above requirements, the HEPA vacuum shall be run continuously during the glovebag procedure until completion at which time the glovebag shall be collapsed by the HEPA vacuum prior to removal from the pipe/component.
2. The HEPA vacuum shall be attached and operated as needed to prevent collapse of the glovebag during the removal process.

3.4 LOCKDOWN ENCAPSULATION

3.4.1 GENERAL

Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, all piping surfaces shall be encapsulated with a bridging encapsulant.

3.4.2 SEALING EXPOSED EDGES

Seal edges of ACM exposed by removal work with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant.

3.5 DISPOSAL OF ACM WASTE MATERIALS

3.5.1 GENERAL

Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA, and DOT. The landfill requirements for packaging shall also be met. Transport shall be in compliance with 49 CFR 100–185 regulations. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.5.2 PROCEDURES

A. The VA shall be notified at least 24 hours in advance of any waste removed from the containment
B. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged and wetted with amended water prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental

opening and/or leakage. The top shall be twisted tightly and goose necked prior to sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers shall be covered at all times when not in use. NESHAP's signs shall be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.

C. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Sealed waste bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second waste bag and sealed, which then shall also be wet wiped, or HEPA vacuumed.
D. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

3.6 PROJECT DECONTAMINATION

3.6.1 GENERAL

A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH/CIH.
B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination shall be done by cleaning the primary barrier poly prior to its removal and cleanings of surfaces of the regulated area after the primary barrier removal.
C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination shall be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

3.6.2 REGULATED AREA CLEARANCE

Air testing and other requirements which shall be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

3.6.3 WORK DESCRIPTION

Decontamination includes the clearance air testing in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities, and negative pressure systems.

3.6.4 PRE-DECONTAMINATION CONDITIONS

A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removed and disposed of along with any gross debris generated by the work.
B. At the start of decontamination, the following shall be in place:
   1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.

2. Decontamination facilities, if required for personnel and equipment in operating condition.

3.6.5 FIRST CLEANING

Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping/air blowing methods. Use each surface of a wetted cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. Remove all filters in the air handling system and dispose of as ACM waste in accordance with these specifications. The negative pressure system shall remain in operation during this time. Additional cleaning(s) shall be needed as determined by the CPIH/VPIH/CIH.

3.6.6 PRE-CLEARANCE INSPECTION AND TESTING

The CPIH/CIH and VPIH/CIH shall perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH/CIH shall perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH/CIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

3**.6.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES**

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification.

3.7 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING

3.7.1 GENERAL

Notify the COR 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing shall be performed by the VPIH/CIH after the final cleaning.

3.7.2 FINAL VISUAL INSPECTION

Final visual inspection shall include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust, or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples shall be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

3.7.3 FINAL AIR CLEARANCE TESTING

A. After an acceptable final visual inspection by the VPIH/CIH and COR, the VPIH/CIH shall perform the final clearance testing. Air samples shall be collected and analyzed in accordance with procedures for AHERA in this specification. If work is less than 260 lf/160 sf/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. All additional inspection and testing costs shall be borne by the Contractor.
B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.7.4 FINAL AIR CLEARANCE PROCEDURES

A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm^2) by AHERA TEM.
B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH shall secure samples and analyze them according to the following procedures:
   1. Fibers Counted: “Fibers” referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the AHERA TEM method.
   2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques except where soil is not encapsulated or enclosed. Samples shall be collected on 0.8µ MCE filters for PCM analysis and 0.45µ Polycarbonate filters for TEM. A minimum of 1200 Liters of using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples shall be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.

3.7.5 CLEARANCE SAMPLING USING PCM

A. The VPIH/CIH shall perform clearance samples as indicated by the specification.
B. The NIOSH 7400 PCM method shall be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples shall be collected. All samples shall be equal to or less than 0.01 f/cc to clear the regulated area.

3.7.6 CLEARANCE SAMPLING USING TEM

A. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.
B. The TEM method shall be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 13 clearance samples shall be collected. All samples shall be equal to or less than 70 AHERA structures per square millimeter (s/mm^2) AHERA TEM.

3.7.7 LABORATORY TESTING OF PCM SAMPLES

The services of an AIHA accredited laboratory shall be employed by the VA to perform analysis for the PCM air samples. The accredited laboratory shall be successfully participating in the AIHA Proficiency Analytical Testing (PAT) program. Samples shall be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results shall be furnished to the VA’s representative and the Contractor.

3.7.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to a NIST accredited laboratory for analysis by TEM. The laboratory shall be successfully participating in the NIST Airborne Asbestos Analysis (TEM) program. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor

3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.8.1 COMPLETION OF ABATEMENT WORK

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area. Complete asbestos abatement work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

A. Remove all equipment, materials, and debris from the project area.
B. Package and dispose of all asbestos waste as required. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA, and DOT. The landfill requirements for packaging shall also be met. Transport shall be in compliance with 49 CFR 100-185 regulations.
C. Repair or replace all interior finishes damaged during the abatement work.
D. The VA shall be notified of any waste removed from the containment prior to 24 hours.
E. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

The CPIH/CIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

3.8.3 WORK SHIFTS

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday - Friday excluding Federal Holidays. Any change in the work schedule shall be approved in writing by the COR.

3.8.4 RE-INSULATION

If required as part of the contract, replace all asbestos containing insulation with suitable non-asbestos material. Provide MSDS for all replacement materials. Refer to Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE: _____ VA Project #: _____

PROJECT NAME: _____ Abatement Contractor: _____

VAMC/ADDRESS: _____

1. I certify that I have personally inspected, monitored, and supervised the abatement work of (specify regulated area or Building):

   which took place from / / to / /

2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.

3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.

4. That all employees of the Abatement Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.

5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.

6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.

7. That all glovebag work was done in accordance with OSHA requirements and the manufacturer’s recommendations.

CPIH/CIH Signature/Date: _____

CPIH/CIH Print Name: _____

Abatement Contractor Signature/Date: _____

Abatement Contractor Print Name: _____

_____

ATTACHMENT #2
CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME:_____ DATE: _____

PROJECT ADDRESS:_____

ABATEMENT CONTRACTOR'S NAME:_____

WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the owner for the above project requires that: You shall be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You shall be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You shall receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate, you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

Physical Characteristics and Background Information on Asbestos
Potential Health Effects Related to Exposure to Asbestos
Employee Personal Protective Equipment
Establishment of a Respiratory Protection Program
State of the Art Work Practices
Personal Hygiene
Additional Safety Hazards
Medical Monitoring
Air Monitoring
Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and shall have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature:_____

Printed Name:_____

Social Security Number:_____

Witness:_____

ATTACHMENT #3

AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND TRAINING/ACCREDITATION

VA PROJECT NAME AND NUMBER: _____

VA MEDICAL FACILITY: _____

ABATEMENT CONTRACTOR'S NAME AND ADDRESS: _____

1. I verify that the following individual

   Name: _____ Social Security Number: _____

   who is proposed to be employed in asbestos abatement work associated with the above project by the named Abatement Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Abatement Contractor at the following address.

   Address: _____

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.

3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation shall be kept on-site.

4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH/CIH: _____ Date: _____

Printed Name of CPIH/CIH: _____

Signature of Contractor: _____ Date: _____

Printed Name of Contractor: _____

_____

ATTACHMENT #4

ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S ASBESTOS SPECIFICATIONS

VA Project Location: _____

VA Project #: _____

VA Project Description: _____

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent, and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I shall certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature _____ Date _____

Abatement Contractor Competent Person(s) _____ Date _____

---END---

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Frames
2. Ladders

1.2 RELATED WORK

A. Prime and finish painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size, and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

C. Manufacturer's Certificates:

1. Anodized finish as specified.
2. Live load designs as specified.

D. Design Calculations for specified live loads including dead loads.

E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.4 QUALITY ASSURANCE

A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each product type shall be the same and be made by the same manufacturer.

C. Assembled product to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97.....Wood Screws

B18.2.2-87(R2010).....Square and Hex Nuts

C. American Society for Testing and Materials (ASTM):

A36/A36M-14.....Structural Steel

A47-99(R2014).....Malleable Iron Castings

A48-03(R2012).....Gray Iron Castings

A123-15.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A307-14.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A391/A391M-07(R2015)....Grade 80 Alloy Steel Chain

A786/A786M-15.....Rolled Steel Floor Plate

C1107-13.....Packaged Dry, Hydraulic-Cement Grout (No shrink)

F436-16.....Hardened Steel Washers

F468-06(R2015).....Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws and Studs for General Use

F1667-15.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):

D1.1-15.....Structural Welding Code Steel

D1.2-14.....Structural Welding Code Aluminum

D1.3-18.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 521-01(R2012).....Pipe Railing Manual

AMP 500-06.....Metal Finishes Manual

MBG 531-09(R2017).....Metal Bar Grating Manual

MBG 532-09.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:

SP 1-15.....No. 1, Solvent Cleaning

SP 2-04.....No. 2, Hand Tool Cleaning

SP 3-04.....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.

B. Ladders and Rungs: 120 kg (250 pounds) at any point.

2.2 MATERIALS

A. Structural Steel: ASTM A36.

B. Stainless Steel: ASTM A240, Type 302 or 304.

C. Cast-Iron: ASTM A48, Class 30, commercial pattern.

D. Primer Paint: As specified in Section 09 91 00, PAINTING.

E. Stainless Steel Tubing: ASTM A269, type 302 or 304.

F. Modular Channel Units:

1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
2. Form channel within turned pyramid shaped clamping ridges on each side.
3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.

G. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

B. Fasteners:

1. Bolts with Nuts:
   a. ASME B18.2.2.
   b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
   c. ASTM F468 for nonferrous bolts.
   d. ASTM F593 for stainless steel.
2. Screws: ASME B18.6.1.
3. Washers: ASTM F436, type to suit material and anchorage.
4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.4 FABRICATION GENERAL

A. Material

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named, or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections

1. Except as otherwise specified, connections may be made by welding, riveting, or bolting.
2. Field riveting will not be approved.
3. Design size, number, and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.

5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

D. Fasteners and Anchors
1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self-drilling and tapping screws or bolts.

E. Workmanship
1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.
   c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
   d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
   e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.

f. Prepare members for the installation and fitting of hardware.
g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits, and similar items. Provide reinforcement to support cut edges.
h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.
3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
   b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
5. Cutting and Fitting:
   a. Accurately cut, machine and fit joints, corners, copes, and miters.
   b. Fit removable members to be easily removed.
   c. Design and construct field connections in the most practical place for appearance and ease of installation.
   d. Fit pieces together as required.
   e. Fabricate connections for ease of assembly and disassembly without use of special tools.

f. Joints firm when assembled.

g. Conceal joining, fitting, and welding on exposed work as far as practical.

h. Do not show rivets and screws prominently on the exposed face.

i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:

1. Finish exposed surfaces in accordance with NAAMM AMP 500 Metal Finishes Manual.
2. Steel and Iron: NAAMM AMP 504.
   a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
   b. Surfaces exposed in the finished work:
      1) Finish smooth rough surfaces and remove projections.
      2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
   c. Shop Prime Painting:
      1) Surfaces of Ferrous metal:
         a) Items not specified to have other coatings.
         b) Galvanized surfaces specified to have prime paint.
         c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
         d) Clean of oil, grease, soil, and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
         e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
      2) Non ferrous metals: Comply with MAAMM-500 series.
3. Stainless Steel: NAAMM AMP-504 Finish No. 4.

G. Protection:

1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.

2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:

1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Wall Mounted Items:

1. For items supported by metal stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.
5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

2.6 FRAMES

A. Elevator Entrance Wall Opening.

1. Fabricate of channel shapes, plates, and angles as shown.
2. Weld or bolt head to jamb as shown.
3. Weld clip angles to bottom of frame and top of jamb members extended to structure above for framed construction.
   a. Provide holes for anchors.
   b. Weld head to jamb members.

2.7 LADDERS

A. Steel Ladders:

1. Fixed-rail type with steel rungs shouldered and headed into and welded to rails.
2. Fabricate angle brackets of 50 mm (2 inch) wide by 13 mm (1/2 inch) thick steel; brackets spaced maximum of 1200 mm (4 feet) apart and of length to hold ladder 175 mm (7 inches) from wall to center of rungs. Provide turned ends or clips for anchoring.

3. Provide holes for anchoring with expansion bolts through turned ends and brackets.
4. Where shown, fabricate side rails curved, twisted, and formed into a gooseneck.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.
   1. Provide temporary bracing for such items until concrete or masonry is set.
   2. Place in accordance with setting drawings and instructions.
   3. Build strap anchors, into masonry as work progresses.

C. Set frames of gratings, covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.

D. Field weld in accordance with AWS.
   1. Design and finish as specified for shop welding.
   2. Use continuous weld unless specified otherwise.

E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed, or substrate damaged by their use.

F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

H. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

A. Anchorage to structure.
   1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.

2. Secure supports to concrete inserts by bolting or continuous welding as shown.
3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
4. Secure steel plate or hat channels to studs as detailed.

3.3 HOISTWAY DOOR FRAMES

A. Secure clip angles at bottom of frames to concrete slab with expansion bolts as shown.
B. Level and plumb frame; brace in position required.
C. At masonry, set frames in walls so anchors are built-in as the work progresses unless shown otherwise.
D. Set frames in formwork for frames cast into concrete.
E. Where frames are set in prepared openings, bolt to wall with spacers and expansion bolts.

3.4 OTHER FRAMES

A. Set frame flush with surface unless shown otherwise.
B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
C. Set in formwork before concrete is placed.

3.5 LADDERS

A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.
B. In elevator pits, set ladders to clear all elevator equipment where shown on the drawings.
   1. Where ladders are interrupted by division beams, anchor ladders to beams by welding, and to floors with expansion bolts.
   2. Where ladders are adjacent to division beams, anchor ladders to beams with bent steel plates, and to floor with expansion bolts.
C. Ladder Rungs:
   1. Set ladder rungs into formwork before concrete is placed. Build ladder rungs into masonry as the work progresses.
   2. Set step portion of rung 150 mm (6 inches) from wall.
   3. Space rungs approximately 300 mm (12 inches) on centers.
   4. Where only one rung is required, locate it 400 mm (16 inches) above the floor.

3.6 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum, and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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SECTION 05 59 00
METAL RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies work involved for stainless steel items and assemblies that are in need of restoration.

B. Items specified.

1. Elevator Frames/Jambs
2. Hoistway doors

1.2 RELATED WORK

A. Gypsum board patching: Section 09 29 00, GYPSUM BOARD

B. Painting and touch up: Section 09 91 00, PAINTING

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, finish, and location.

1.4 QUALITY ASSURANCE

A. Each specified product shall meet, as a minimum, visual identical appearance to that of new #4 brushed stainless steel sheet.

B. Dents excluded as per drawings.

C. Restorer qualifications: Provide documentation for (3) previous similar refinishing projects of similar size and scope.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Specialty Steel Industry of North America
Stainless Steel Architectural Facts
Design Guidelines for the Selection and Use of Stainless Steel

C. Sheet Metal & Air Conditioning National Association: SMACNA
Custom Metals.....Interior Applications

D. National Association of Architectural Metal Manufacturers: NAAMM
AMP 500-06

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A240, Type 304, Existing

2.2 RESTORATION GENERAL

A. Material
   1. Use materials of commercial quality and suitable for intended purpose.

B. Workmanship
   1. General:
      a. Restore items to finish specified.
      b. Remove existing surface contaminants with acetone and a non-abrasive cloth.
      c. Remove any scratches by using any variation of restoration techniques, including but not limited to: pumice and water, buffing, polishing, hand held sanding machine, scouring pads (various grits) or sandblasting to restore visual appearance identical to a new #4 brushed stainless steel finish.
      d. Use various restoration techniques to obtain uniform finish on entire piece.
   2. Cleaning:
      a. Remove any surface dust or debris created from the refinishing process by slow wiping the surface with acetone.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set brush pattern in alignment with existing.

3.2 SUPPORTS

A. Anchorage to structure.
   1. Where existing jambs are secured to structure, perform restoration work such that existing anchorage is not affected.

3.3 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, as recommended by the metal manufacture and protected from damage until completion of the project.

---END---

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.2 RELATED WORK:

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings showing framing connection details, fasteners, connections, and dimensions.

C. Manufacturer’s Literature and Data:

1. Submit data for lumber, panels, hardware, and adhesives.
2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

D. Manufacturer’s certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery at site.

1.5 QUALITY ASSURANCE:

A. Installer: A firm with a minimum of three (3) years’ experience in the type of work required by this section.

1.6 GRADING AND MARKINGS:

A. Any unmarked lumber or plywood panel for its grade and species will not be allowed on VA Construction sites for lumber and material not normally grade marked, provide manufacturer’s certificates (approved by

an American Lumber Standards approved agency) attesting that lumber and material meet the specified the specified requirements.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA):

NDS-15.....National Design Specification for Wood Construction

WCD1-01.....Details for Conventional Wood Frame Construction

C. American Society of Mechanical Engineers (ASME):

B18.2.1-12(R2013).....Square and Hex Bolts and Screws

B18.2.2-10.....Square and Hex Nuts

B18.6.1-81(R2008).....Wood Screws

D. ASTM International (ASTM):

A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-11.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness

C1002-14.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs

D198-14.....Test Methods of Static Tests of Lumber in Structural Sizes

D2344/D2344M-13.....Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates

D2559-12a.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions

D6112-13.....Test Methods for Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes

F844-07a(R2013).....Washers, Steel, Plan (Flat) Unhardened for General Use

F1667-13.....Nails, Spikes, and Staples

E. American Wood Protection Association (AWPA):

AWPA Book of Standards

F. Commercial Item Description (CID):

A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

G. Forest Stewardship Council (FSC):

FSC-STD-01-001(Ver. 4-0)FSC Principles and Criteria for Forest Stewardship

H. Military Specification (Mil. Spec.):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

I. U.S. Department of Commerce Product Standard (PS)

PS 1-95.....Construction and Industrial Plywood

PS 20-10.....American Softwood Lumber Standard

J. ICC Evaluation Service (ICC ES):

AC09.....Quality Control of Wood Shakes and Shingles

AC174.....Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.

C. Lumber Other Than Structural:

1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.

2. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and members 152 mm (6 inches) and wider, Number 2 Grade.

D. Sizes:
1. Conforming to PS 20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:
1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
b. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:
1. Comply with Mil Spec. MIL-L-19140.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:
1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

2.2 PLYWOOD:

A. Comply with PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which

identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
   1. AFPA WCD1 for nailing and framing unless specified otherwise.
   2. APA for installation of plywood or structural use panels.

B. Fasteners:
   1. Nails.
      a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
      b. Use special nails with framing connectors.
      c. For sheathing and subflooring, select length of nails sufficient to extend 25 mm (1 inch) into supports.
      d. Use 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
      e. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.
      f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
   2. Bolts:
      a. Fit bolt heads and nuts bearing on wood with washers.
      b. Countersink bolt heads flush with the surface of nailers.
      c. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
   3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
      a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
      b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
   4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.

5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
6. Screws to Join Wood:
   a. Where shown or option to nails.
   b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
   c. Spaced same as nails.

C. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
2. Provide longest lengths practicable.
3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking or Plates:
   a. Stagger end joints between upper and lower pieces.
   b. Nail at ends and not over 610 mm (24 inches) between ends.
   c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.

---END---

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies equipment supports.

1.2 RELATED WORK:

A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

1.3 QUALITY ASSURANCE:

A. Provide roof accessories that are the products of manufacturers regularly engaged in producing the kinds of products specified.

B. For each accessory type provide the same product made by the same manufacturer.

C. Assemble each accessory to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Each item specified showing design, details of construction, installation, and fastenings.

C. Manufacturer's Literature and Data: Each item specified.

D. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

RR-G-1602D.....Grating, Metal, Other Than Bar Type (Floor, Except for Naval Vessels)

C. ASTM International (ASTM):

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate

B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
C726-12.....Mineral Wool Roof Insulation Board
C1289-14a.....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
D1187/D1187M-97(R2011)..Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):
2603-13.....Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
2605-13.....High Performance Organic Coatings on Architectural Extrusions and Panels.
611-14.....Anodized Architectural Aluminum
621-02.....High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

F. American Society of Civil Engineers (ASCE):
ASCE 7-10.....Minimum Design Loads for Buildings and Other Structures

G. U.S. National Archives and Records Administration (NARA):
29 CFR 1910.23.....Guarding Floor and Wall Openings and Holes

PART 2 – PRODUCTS

2.1 MATERIALS:

A. Recycled rubber

2.2 EQUIPMENT SUPPORTS:

A. Supported Load Capacity: 250 lbs.

B. Type - Recycled rubber base support

C. All equipment must adhere to hold down requirements as per applicable wind loads as per 2018 IBC. If supports are set on roof, hold down of equipment to be secured to adjacent building structure.

PART 3 – EXECUTION

3.1 INSTALLATION:

A. Install roof specialties, where indicated on construction documents.

B. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions require sealant.

C. Equipment Supports: Do not anchor to insulating concrete or metal deck. Anchor only to building structure as per manufacturers recommendations.

3.2 PROTECTION:

A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies spray-applied mineral fiber and cementitious coverings to provide fire resistance any observed damaged areas of hoistway shafts.

1.2 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Installer qualifications.

D. Testing laboratory accreditations.

E. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

F. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

G. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver to jobsite in sealed containers marked and labeled to show manufacturer's name and brand and UL certification markings of compliance with the specified requirements.

B. Remove damaged or opened containers from the site.

C. Store the materials off the ground, under cover, away from damp surfaces.

D. Keep dry until ready for use.

E. Remove materials that have been exposed to water before installation from the site.

1.4 FIELD CONDITIONS:

A. Temperature: Do not apply fireproofing when substrate or ambient temperature is below 4 degrees C (40 degrees F) unless temporary protection and heat are provided to maintain temperature at or above stated value during application and for 24 hours before and after application.

B. Humidity: Maintain relative humidity levels within limits recommended by fireproofing manufacturer.

C. Ventilation: Provide ventilation to properly dry the fireproofing after application. Provide a minimum of four (4) air exchanges per hour by forced air circulation. When permitted by Contracting Officer Representative (COR), ventilate by natural circulation.

1.5 QUALITY ASSURANCE:

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer’s products according to specified requirements. Submit manufacturer’s certification that each installer is trained and qualified to install the specified fireproofing. Submit evidence that each installer has a minimum of three (3) years’ experience and a minimum of four (4) installations using the specified fireproofing.

B. Testing Laboratory Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority. Submit a copy of the Certificate of Accreditation and Scope of Accreditation.

C. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

D. Manufacturer's inspection and approval of surfaces to receive fireproofing.

E. Manufacturer's approval of fireproofing applications.

F. Manufacturer's approval of completed installation.

G. Manufacturer's representative is to observe and advise at the commencement of application and is required to visit the site as required thereafter for the purpose of ascertaining proper application.

H. Pre-Application Test Area.

1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
   a. Apply to one (1) column.
   b. Apply for the hourly ratings required in the construction documents.
2. Install in location selected by the COR, for approval by the representative of the fireproofing material manufacturer and the COR.
3. Perform Bond test for cohesive and adhesive strength in accordance with ASTM E736 for each applied fireproofing design used.
4. Perform density test in accordance with ASTM E736 for each applied fireproofing design used.
5. Do not proceed in other areas until installation of test area has been completed and approved.
6. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

C841-03(R2013).....Installation of Interior Lathing and Furring
C847-14.....Metal Lath
E84-14.....Surface Burning Characteristics of Building Materials
E119-12a.....Fire Tests of Building Construction and Materials
E605-93(R2011).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members
E736-00(R2011).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92(R2011).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92(R2011).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92(R2011).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93(R2011).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93(R2011).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

E1042-02(R2014).....Acoustically, Absorptive Materials Applied by Trowel or Spray.

G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):
Certification Listings..Latest Edition

E. Factory Mutual System (FM):
Approval Guide.....Latest Edition including Supplements

F. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SPRAYED-ON FIREPROOFING:

A. ASTM E1042, Class (a), Category A.
   1. Type I, factory mixed cementitious materials with approved aggregate.
   2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 240 kg per cubic meter (15 lb. per cubic feet) density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

B. Materials containing asbestos are not permitted.

C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3 m (10 ft.)
2.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.
3.	Bond Impact	ASTM E760	No cracking, spalling, or delamination.
4.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 9.57 kPa (200 lbf per sq. ft.) for protected areas. 19.15 kPa (400 lbf per sq. ft.) for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27 gm per sq. meter (0.025 gm per sq. ft.).
6.	Compressive Strength	ASTM E761	Minimum compressive strength 48 kPa (1000 psf).
7.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 25 or less smoke developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE:

A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER:

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

E. VOC content: Product to comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, (EPA Method 24):

1. Flat Paints and Coatings: 50 g/L.
2. Non flat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.

2.4 WATER:

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL:

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg per square meter (1.7 pounds per square yard) or as required, according to fire-resistance designs indicated and fire proofing manufacturer’s written instructions.

B. Fasteners: ASTM C841.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachments.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. When applied in conjunction with roof structures or roof decks, verify that roofing, installation of rooftop HVAC equipment, and other related work are complete.

F. Verify temperature and enclosure conditions required by fire-proofing material manufacturer.

G. Conduct tests according to fireproofing manufacturer’s written instructions to verify that substrates are free of substances capable of interfering with bond. Submit test report.

3.2 APPLICATION:

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Cover other work and exterior openings subject to damage from fallout or overspray of fireproofing materials during application.

D. Application of Metal Lath:

1. Apply to beam and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
2. Apply to beam flanges 305 mm (12-inches) or more in width.
3. Apply to column flanges 406 mm (16-inches) or more in width.
4. Apply to beam or column web 406 mm (16-inches) or more in depth.
5. Tack weld or mechanically fasten on maximum of 305 mm (12-inch) center.
6. Lap and tie lath member in accordance with ASTM C841.

E. Mix and apply in accordance with manufacturer's instructions.

1. Mechanically control material and water ratios.
2. Apply adhesive and sealer, when not an integral part of the materials, in accordance with the manufacturer's instructions.
3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.

4. Minimum ASTM E605 applied dry density per cubic meter (cubic foot) for the underside of the walk on deck (interstitial) hung purlin or beam and steel deck, columns in interstitial spaces and mechanical equipment rooms to be as follows:
   a. Type I - 350 kg per cubic meter (22 lb. per cubic ft.).
   b. Type II - 240 kg per cubic meter (15 lb. per cubic ft.).
   c. Provide materials with higher density of 640 kg per cubic metric (40 lb. per cubic feet) in mechanical rooms and parking garages.

F. Complete application is to be completed in one area. Inspection and approval by COR are required before removal of application equipment and proceeding with further work.

3.3 FIELD TESTS:

A. The applied fireproofing to be tested by a COR approved independent testing laboratory and paid for by the Contractor. Submit test reports documenting results of tests on the applied material in the project.

B. COR will select area to be tested in specific bays on each floor using a geometric grid pattern. Apply test sample every 929 square meters (10,000 square feet) of floor area or two (2) for each floor, whichever produces the greatest number of test areas.

C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test are not acceptable.

D. Areas showing less than required fireproofing characteristics are not suitable for the following field tests.
   1. Test for cohesion/adhesion: ASTM E736.
   2. Test for bond impact strength: ASTM E760.

3.4 PATCHING AND REPAIRING:

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material manufacturer's recommendations.
   1. Respray areas requiring additional fireproofing material to provide the required thickness and replace dislodged or removed material.
   2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
   3. Do not hand mix material.

C. Repair:

1. Respray test and rejected areas.
2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.6 SCHEDULE:

A. Apply fireproofing material in interior structural steel members and on underside of interior steel floor and roof decks, except on following surfaces:

1. Structural steel and underside of steel decks in elevator or dumbwaiter machine rooms.
2. Steel members in elevator hoist ways.
3. Areas used as air handling plenums.
4. Steel to be encased in concrete or designated to receive other type of fireproofing.

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SECTION 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.

B. Provide UL or equivalent approved firestopping system for the closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK:

A. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

B. Sealants and application: Section 07 92 00, JOINT SEALANTS.

C. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Installer qualifications.

D. Inspector qualifications.

E. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

F. List of FM, UL, or WH classification number of systems installed.

G. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

H. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

1.4 DELIVERY AND STORAGE:

A. Deliver materials in their original unopened containers with manufacturer’s name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

1.5 QUALITY ASSURANCE:

A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.

C. Inspector Qualifications: Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

E84-14.....Surface Burning Characteristics of Building Materials

E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components

E814-13a.....Fire Tests of Through-Penetration Fire Stops

E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops

E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

C. FM Global (FM):

Annual Issue Approval Guide Building Materials

4991-13.....Approval of Firestop Contractors

D. Underwriters Laboratories, Inc. (UL):

Annual Issue Building Materials Directory

Annual Issue Fire Resistance Directory

723-10(2008).....Standard for Test for Surface Burning Characteristics of Building Materials

1479-04(R2014).....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):
Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 in.) nominal pipe or 0.01 sq. m (16 sq. in.) in overall cross sectional area.

C. Firestop sealants used for firestopping or smoke sealing to have the following properties:
1. Contain no flammable or toxic solvents.
2. Release no dangerous or flammable out gassing during the drying or curing of products.
3. Water-resistant after drying or curing and unaffected by high humidity, condensation, or transient water exposure.
4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:
1. Classified for use with the particular type of penetrating material used.
2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping

systems that allow unrestricted cable changes without damage to the seal.

E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.

F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.

G. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.

H. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 101 mm (4 in.) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Submit product data and installation instructions, as required by article, submittals, after an on-site examination of areas to receive firestopping.

B. Examine substrates and conditions with installer present for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.

B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.

B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP:

A. As work on each floor is completed, remove materials, litter, and debris.

B. Clean up spills of liquid type materials.

C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or

damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).

B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and type of firestopping used at each location; type is to be recorded by UL listed printed numbers.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

A. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

B. Sound Rated Gypsum Partitions/Sound Sealants: Section 09 29 00, GYPSUM BOARD.

C. Mechanical Work: Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.

B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.4 CERTIFICATION:

A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Installer qualifications.

D. Contractor certification.

E. Manufacturer's installation instructions for each product used.

F. Cured samples of exposed sealants for each color.

G. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

H. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:

a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).

b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.8 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Backing Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

1.9 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".

B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. ASTM International (ASTM):

C509-06	Elastomeric Cellular Preformed Gasket and Sealing Material
C612-14	Mineral Fiber Block and Board Thermal Insulation
C717-14a	Standard Terminology of Building Seals and Sealants
C734-06(R2012)	Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering
C794-10	Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
C919-12.	Use of Sealants in Acoustical Applications.
C920-14a	Elastomeric Joint Sealants.
C1021-08(R2014)	Laboratories Engaged in Testing of Building Sealants
C1193-13	Standard Guide for Use of Joint Sealants.
C1248-08(R2012)	Test Method for Staining of Porous Substrate by Joint Sealants
C1330-02(R2013)	Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants

C1521-13	Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
D217-10	Test Methods for Cone Penetration of Lubricating Grease
D1056-14	Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
E84-09	Surface Burning Characteristics of Building Materials

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

D. Environmental Protection Agency (EPA):

40 CFR 59(2014)	National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Floor Joint Sealant:

1. ASTM C920, Type S or M, Grade P, Class 25, Use T.
2. Provide location(s) of floor joint sealant as follows.
   a. Seats of metal thresholds exterior doors.
   b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

B. Interior Sealants:

1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
   a. Architectural Sealants: 250 g/L.
   b. Sealant Primers for Nonporous Substrates: 250 g/L.
   c. Sealant Primers for Porous Substrates: 775 g/L.
2. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
3. Provide location(s) of interior sealant as follows:
   a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
   b. Perimeter of doors, windows, access panels which adjoin concrete or masonry surfaces.

c. Interior surfaces of exterior wall penetrations.

2.2 COLOR:

A. Sealants used with exposed masonry are to match color of mortar joints.

B. Sealants used with unpainted concrete are to match color of adjacent concrete.

C. Color of sealants for other locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type that are non staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.5 CLEANERS-NON POROUS SURFACES:

A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
    a. Metal.
    b. Glass.

C. Do not cut or damage joint edges.

D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.

1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.

D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.

B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.

4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to “skin” over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
11. Replace sealant which is damaged during construction process.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

C. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes, and similar penetrations. To seal electrical boxes, seal sides and backs.

5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.

B. Leave adjacent surfaces in a clean and unstained condition.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow metal doors hung in hollow metal frames at interior locations.
2. Hollow metal door frames for wood doors and borrowed lights at interior locations. Glazed openings in hollow metal doors.

1.2 RELATED REQUIREMENTS

A. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.

B. Door Hardware: Section 08 71 00, DOOR HARDWARE.

C. Card Readers and Biometric Devices: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. American National Standard Institute (ANSI):

1. A250.8-2014 - Standard Steel Doors and Frames.

C. ASTM International (ASTM):

1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip.
3. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

D. Federal Specifications (Fed. Spec.):

1. L-S-125B - Screening, Insect, Nonmetallic.

E. Master Painters Institute (MPI):

1. No. 18 - Primer, Zinc Rich, Organic.

F. National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

G. National Fire Protection Association (NFPA):

1. 80-16 - Fire Doors and Other Opening Protectives.

H. UL LLC (UL):

1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.

2. 1784-15 - Air Leakage Tests of Door Assemblies and Other Opening Protectives.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Include schedule showing each door and frame requirements fire label for openings.
3. Installation instructions.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

E. Test reports: Certify products comply with specifications.

1. Sound rated door.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

1.6 DELIVERY

A. Fasten temporary steel spreaders across the bottom of each door frame before shipment.

B. Deliver products in manufacturer's original sealed packaging.

C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.

D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

1.8 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design hollow metal doors and frames complying with specified performance:
   1. Fire Doors and Frames: UL 10C; NFPA 80 labeled.
      a. Fire Ratings: See drawings.
   2. Smoke Control Doors and Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cu. m/s/sq. m (3.0 cfm/sf) at 24.9 Pa (0.10 inches water gage) pressure differential.
   3. Sound Rated Doors and Frames: Minimum 45 sound transmission class (STC) when tested according to ASTM E90.

2.2 MATERIALS

A. Stainless Steel: ASTM A240/A240M; Type 304 Type 316.
B. Sheet Steel: ASTM A1008/A1008M, cold-rolled.
C. Galvanized Sheet Steel: ASTM A653.
D. Insect Screening: ASTM D3656/D3656M, 18 by 18 aluminum wire mesh.
E. Aluminum Sheet: ASTM B209M (ASTM B209).
F. Aluminum Extrusions: ASTM B221M (ASTM B221).

2.3 PRODUCTS - GENERAL

A. Provide hollow metal doors and frames from one manufacturer.
B. Sustainable Construction Requirements:
   1. Steel Recycled Content: 30 percent total recycled content, minimum.
   2. Stainless Steel Recycled Content: 70 percent total recycled content, minimum.
   3. Aluminum Recycled Content: 80 percent total recycled content, minimum.

2.4 HOLLOW METAL DOORS

A. Hollow Metal Doors: ANSI A250.8; 44 mm (1-3/4 inches) thick. See drawings for sizes and designs.
   1. Interior Doors: Level 2 and Physical Performance Level B, heavy duty; Model 2, seamless at elevator machine room.
B. Door Faces:

1. Interior Doors: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.
2. Exterior Doors: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.

C. Door Cores:

1. Interior Doors: Kraft paper honeycomb or vertical steel stiffeners.
2. Fire Doors: Manufacturer's standard complying with specified fire rating performance.

2.5 HOLLOW METAL FRAMES

A. Hollow Metal Frames: ANSI A250.8; face welded. See drawings for sizes and designs.

1. Interior Frames:
   a. Level 1 Hollow Metal Doors: 1.0 mm (0.042 inch) thick.
   b. Level 2 Hollow Metal Doors: 1.3 mm (0.053 inch) thick.
   c. Level 1 Hollow Metal Doors: 1.0 mm (0.042 inch) thick.

B. Frame Materials:

1. Interior Frames: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.

2.6 FABRICATION

A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.

B. Hollow Metal Door Fabrication:

1. Close top edge of exterior doors flush and seal to prevent water intrusion.
2. Fill spaces between vertical steel stiffeners with insulation.

C. Fire Doors:

1. Close top and vertical edges flush.
2. Apply steel astragal to active leaf at pair and double egress doors.
   a. Exception: Where vertical rod exit devices are specified for both leaves swinging in same direction.
3. Fire Door Clearances: NFPA 80.

2.7 FINISHES

A. Galvanized Steel : ANSI A250.8; shop primed.

2.8 ACCESSORIES

A. Primers: ANSI A250.8.

B. Barrier Coating: ASTM D1187/D1187M.

C. Welding Materials: AWS D1.1/D1.1M, type to suit application.

D. Clips Connecting Members and Sleeves: Match door faces.

E. Fasteners: Galvanized steel.

1. Metal Framing: Steel drill screws.

F. Anchors: Galvanized steel.

G. Galvanizing Repair Paint: MPI No. 18.

H. Insulation: Unfaced mineral wool.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for the COR’s consideration.

2. Install fire doors and frames according to NFPA 80.

3.3 FRAME INSTALLATION

A. Apply barrier coating to concealed surfaces of frames built into masonry.

B. Plumb, align, and brace frames until permanent anchors are set.

1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.

2. Use wood spreaders at bottom of frame when shipping spreader is removed.

3. Where construction permits concealment, leave shipping spreaders in place after installation, otherwise remove spreaders when frames are set and anchored.

4. Remove wood spreaders and braces when walls are built and jamb anchors are secured.

C. Floor Anchors:

1. Anchor frame jambs to floor with two expansion bolts.

a. Lead Lined Frames: Use 9 mm (3/8 inch) diameter bolts.

b. Other Frames: Use 6 mm (1/4 inch) diameter bolts.

2. Power actuated drive pins are acceptable to secure frame anchors to concrete floors.

D. Jamb Anchors:

1. Masonry Walls:
   a. Embed anchors in mortar.
   b. Fill space between frame and masonry with grout or mortar as walls are built.
2. Metal Framed Walls: Secure anchors to sides of studs with two fasteners through anchor tabs.
3. Prepared Masonry and Concrete Openings:
   a. Direct Securement: 6 mm (1/4 inch) diameter expansion bolts through spacers.
   b. Subframe or Rough Buck Securement:
      1) 6 mm (1/4 inch) diameter expansion bolts on 600 mm (24 inch) centers.
      2) Power activated drive pins on 600 mm (24 inches) centers.
   c. Secure two-piece frames to subframe or rough buck with machine screws on both faces.

E. Frames for Sound Rated Doors: Fill frames with insulation.

F. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.
2. Repair painted surfaces with touch up primer.

3.4 DOOR INSTALLATION

A. Install doors plumb and level.

B. Adjust doors for smooth operation.

C. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.
2. Repair painted surfaces with touch up primer.

3.5 CLEANING

A. Clean exposed door and frame surfaces. Remove contaminants and stains.

3.6 PROTECTION

A. Protect doors and frames from construction operations.

B. Remove protective materials immediately before acceptance.

C. Repair damage.

---END---

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

B. Application of Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

C. Painting: Section 09 91 00, PAINTING.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

E. The following items shall be of the same manufacturer, except as otherwise specified:

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.
4. Exit devices.
5. Floor closers.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:

1. Locks, latchsets, and panic hardware: 5 years.
2. Door closers and continuous hinges: 10 years.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an

independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR's office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 INSTRUCTIONS

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by set numbers.

B. Keying: Coordinate cores and key with COR and for type, keying, and number of keys to be provided.

1.9 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

B. American Society for Testing and Materials (ASTM):

F883-04.....Padlocks

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....Butts and Hinges

A156.2-03.....Bored and Pre-assembled Locks and Latches

A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts

A156.4-08.....Door Controls (Closers)

A156.5-14.....Cylinders and Input Devices for Locks.

A156.6-05.....Architectural Door Trim
A156.8-05.....Door Controls-Overhead Stops and Holders
A156.11-14.....Cabinet Locks
A156.12-05 .....Interconnected Locks and Latches
A156.13-05.....Mortise Locks and Latches Series 1000
A156.14-07 .....Sliding and Folding Door Hardware
A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical
A156.16-08.....Auxiliary Hardware
A156.17-04 .....Self-Closing Hinges and Pivots
A156.18-06.....Materials and Finishes
A156.20-06 .....Strap and Tee Hinges, and Hasps
A156.21-09.....Thresholds
A156.22-05.....Door Gasketing and Edge Seal Systems
A156.23-04.....Electromagnetic Locks
A156.24-03.....Delayed Egress Locking Systems
A156.25-07 .....Electrified Locking Devices
A156.26-06.....Continuous Hinges
A156.28-07 .....Master Keying Systems
A156.29-07 .....Exit Locks and Alarms
A156.30-03 .....High Security Cylinders
A156.31-07 .....Electric Strikes and Frame Mounted Actuators
A156.36-10.....Auxiliary Locks
A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):
80-10.....Fire Doors and Other Opening Protectives
101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):
Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types

of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless-steel material.
2. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless-steel material.

B. Provide quantity and size of hinges per door leaf as follows:
   1. Doors up to 1210 mm (4 feet) high: 2 hinges.
   2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
   3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
   4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
   5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
   6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
   7. Provide heavy-weight hinges where specified.
   8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above, and continuous hinges specified below.

2.3 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer for each type specified.

2.4 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment, or other parts of

building construction. For concrete, masonry, or quarry tile construction, use lead expansion shields for mounting door stops.

C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers(rubber pads having concave face) to receive turn piece or button.

D. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.

E. Where drywall partitions occur, use floor stops.

F. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

G. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

H. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.5 OVERHEAD DOOR STOPS AND HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.6 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for holders where necessary.

2.7 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than six pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key

System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the installation of final cores.

2.8 KEYS

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	**Quantity**
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	2 keys

2.9 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals.

2.10 FLUSH BOLTS (LEVER EXTENSION)

A. Conform to ANSI A156.16. Flush bolts as specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.

C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.11 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.12 COORDINATORS

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.13 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. For thresholds at elevators entrances see other sections of specifications.

C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.

D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.14 MISCELLANEOUS HARDWARE

A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E07213, conforming to ANSI A156.11. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Cylinders for Various Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur. Provide cylinders to operate locking devices where specified for following partitions and doors:

1. Folding doors and partitions.
2. Wicket door (in roll-up door assemblies).
3. Slide-up doors.
4. Swing-up doors.
5. Fire-rated access doors-Engineer's key set.
6. Doors from corridor to electromagnetic shielded room.
7. Day gate on vault door.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames, and frames for sound-resistant, lightproof, and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.15 PADLOCKS FOR VARIOUS DOORS, GATES, AND HATCHES

A. ASTM E883, size 50 mm (2 inch) wide chain; furnish extended shackles as required by job conditions. Provide padlocks, with key cylinders, for each door in following areas as noted.

B. Key padlocks as follows:

1. Constant Temperature and Cold Rooms in Research Departments: Research Laboratory Set.
2. Cold Room in Morgue Department: Autopsy Set.
3. Refrigerators in Canteen Department: Canteen Storage Set.
4. All Refrigerator Rooms in Main Kitchen Department: Kitchen Storage Set.
5. Chain Link Fence Gates for Electrical Substation and other Fenced Buildings or Areas: Engineer's set, except as otherwise specified.
6. Chain Link Fence Gates for Oxygen Storage Buildings: Maintenance supply set.
7. Roof Access and Scuttles: Engineer's set.
8. Hinged Wicket in Post Office Partitions: Post Office set.

C. Omit padlocks on communicating refrigerator doors.

2.16 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:
1. Hinges --exterior doors: 626 or 630.
2. Hinges --interior doors: 652 or 630.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Thresholds: Mill finish aluminum.
6. Cover plates for floor hinges and pivots: 630.
7. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Special Finish: Exposed surfaces of hardware for dark bronze anodized aluminum doors shall have oxidized oil rubbed bronze finish (dark bronze) finish on door closers shall closely match doors.

F. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.17 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	**Base Metal**
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware, and submit locations to VA COR for approval.

B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by

building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with hex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by COR. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Door Description	**Number butts**
Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile,

or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; show in presence of COR that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also, a copy of the invoice shall be sent to the COR for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

3.5 HARDWARE SETS

A. Hardware sets for new doors are located on sheet A-101.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies subsurface preparation requirements for areas to receive the installation of VCT flooring. This section includes removal of existing floor coverings, testing concrete for moisture and pH, remedial floor coating for concrete floor slabs having unsatisfactory moisture or pH conditions, and floor leveling and repair as required.

1.2 RELATED WORK

A. Section 07 92 00, JOINT SEALANTS.

B. Section 09 65 19, RESILIENT TILE FLOORING

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.

B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer

C. Product Data:

1. Moisture remediation system
2. Underlayment Primer
3. Cementitious Self-Leveling Underlayment
4. Cementitious Trowel-Applied Underlayment (Not suitable for resinous floor finishes)

D. Test Data:

1. Moisture test and pH results performed by a qualified independent testing agency or warranty holding manufacturer’s technical representative.

1.4 DELIVERY AND STORAGE

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.

B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.

B. American Society for Testing and Materials (ASTM):

	Test Method for Tensile Properties of Plastics
D4259-*18(2018)*	Standard Practice for Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.
C109/C109M *-(2020)*	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) Modified Air Cure Only
D7234-*19 (2019)*	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
E96/E96M - 16 *(2016)*	Standard Test Methods for Water Vapor Transmission of Materials
F710-*19 (2019)*	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
F1869-*16 (2016)*	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-*19 (2019)*	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C348-20 ***(2020)***	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C191-19 ***(2019)***	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle

PART 2 - PRODUCTS

2.1 MOISTURE REMEDIATION COATING

A. System Descriptions:

1. High-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment. For use under resinous products, VCT, tile and carpet where issues caused by moisture vapor are a concern.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers and installation method. Verify compatibility with substrate. Use manufacturer’s standard components, compatible with each other and as follows:

1. Liquid applied coating:

a. Resin: epoxy.

b. Formulation Description: Multiple component high solids.

c. Application: Per manufacturer's written installation requirements.

d. Thickness: minimum 10 mils

D. Material Vapor Permeance: Application shall achieve a permeance rating of less than 0.1 perm in accordance with ASTM E96/E96M.

E. Maximum RH requirement: 100% testing in accordance with ASTM F2170.

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	SCAMD Rule 1113	25 grams per liter
Permeance	ASTM E96	0.1 perms
Tensile Modulus	ASTM D638	$1.9X10^5$psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufacture's Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% bond to concrete failure

A. System Descriptions:

1. High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.

C. System Characteristics:

1. Wearing Surface: smooth
2. Thickness: Per architectural drawings, ranging from feathered edge to 1/2", per application. Applications greater than 1" require additional 3/8" aggregate to mix or as recommended by manufacturer.

D. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

E. Compressive Strength: Minimum 4100 psi in 28 days in accordance with ASTM C109/C109M.

F. Flexural Strength: Minimum 1000 psi in 28 days in accordance with ASTM C348

G. Dry Time: Underlayment shall receive the application of floor coverings in 16 hours min. or as per manufacturer’s recommendations.

H. Primer: compatible and as recommended by manufacturer for use over intended substrate

I. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Primer:
   a. Resin: copolymer
   b. Formulation Description: single component ready to use.
   c. Application Method: Squeegee and medium nap roller. All puddles shall be removed, and material shall be allowed to dry, 1-2 hours at 70F/21C.
   d. Number of Coats: (1) one.
2. Grout Resurfacing Base:
   a. Formulation Description: Single component, cementitious self-leveling high-early and high-ultimate strength grout.
   b. Application Method: colloidal mix pump, cam rake, spike roll.
      1) Thickness of Coats: Per architectural scope, 1” lifts.
      2) Number of Coats: More than one if needed.
   c. Aggregates: for applications greater than 1inch, require additional 3/8” aggregate to mix.

Property	Test	Value
Compressive Strength	ASTM C109/C109M	2,200 psi @ 24 hrs 3,000 psi @ 7 days
Initial set time Final Set time	ASTM C191	30-45 min. 1 to 1.5 hours
Bond Strength	ASTM D7234	100% bond to concrete failure

2.3 CEMENTITIOUS TROWEL-APPLIED UNDERLAYMENT

A. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

B. Compressive Strength: Minimum 4000 psi in 28 days

C. Trowel-applied underlayment shall not contain silica quartz (sand).

D. Dry Time: Underlayment shall receive the application of floor covering as per manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.

C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION

A. Existing concrete slabs with existing floor coverings:

1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
2. Remove existing floor covering and adhesives. Comply with local, state, and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.

B. Concrete shall meet the requirements of ASTM F710 and be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.

C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.

D. Prepare concrete substrates per ASTM D4259 as follows:

1. Comply with manufacturer's written instructions.

E. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.

F. Verify that concrete substrates are dry.

G. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of per flooring manufactures formal and project specific written recommendation.

H. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity per flooring manufacture’s formal and project specific written recommendation.

I. Provide a written report showing test placement and results.

J. Prepare joints in accordance with Section 07 92 00, JOINT SEALANTS and material manufacturer’s instructions.

K. Alkalinity: Measure surface pH in accordance with procedures provided in ASTM F710 or as outlined by qualified testing agency or flooring manufacturer’s technical representative.

L. Tolerances: Subsurface shall meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer. Tolerance shall also not to exceed 1/4” deviation in 10’. As required, install underlayment to achieve required tolerance.

M. Other Subsurface: For all other subsurface conditions, such as wood or metal, contact the floor finish or underlayment manufacturer, as appropriate, for proper preparation practices.

3.3 MOISTURE REMEDIATION COATING:

A. Where results of relative humidity testing (ASTM F2170) exceed the requirements of the specified flooring manufacturer, apply remedial coating as specified to correct excessive moisture condition.

B. Prior to remedial floor coating installation mechanically prepare the concrete surface to provide a concrete surface profile in accordance with ASTM D4259.

C. Mix and apply moisture remediation coating in accordance with manufacturer’s instructions.

3.4 CEMENTITOUS UNDERLAYMENT:

A. Install cementitious self-leveling underlayment as required to correct surface defects, address non-moving cracks or joints, and provide a smooth surface for the installation of floor covering.

B. Mix and apply in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, tempered hardwood, or other suitable protection course

3.6 FIELD QUALITY CONTROL

A. Where specified, field sampling of products shall be conducted by a qualified, independent testing facility.

---END---

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

A. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

B. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.

C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Studs, runners, and accessories.
2. Hanger inserts.
3. Channels (Rolled steel).
4. Furring channels.
5. Screws, clips, and other fasteners.

C. Shop Drawings:

1. Typical ceiling suspension system.
2. Typical metal stud and furring construction system including details around openings and corner details.
3. Typical shaft wall assembly
4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM)

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

A653/653M-11.....Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems

C636-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-09.....Non-Structural Steel Framing Members

C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....Installation of Interior Lathing and Furring

C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

E580-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes as shown.

1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).

2. Runners same thickness as studs.
3. Exception: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use C 645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).

B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.

C. Studs 3600 mm (12 feet) or less in length shall be in one piece.

D. Shaft Wall Framing:
1. Conform to rated wall construction.
2. C-H Studs or C-T Studs.
3. E Studs.
4. J Runners.
5. Steel Jamb-Strut.

2.3 FURRING CHANNELS

A. Rigid furring channels (hat shape): ASTM C645.

B. Resilient furring channels:
1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.

C. Rolled Steel Channels: ASTM C754, cold rolled; or ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. For fire rated construction: Type and size same as used in fire rating test.

C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

D. Clips: ASTM C841 (paragraph 6.11), manufacturer’s standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.

F. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

G. Attachments for Wall Furring:

1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.

H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 610 mm (24 inches) on center.

C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.

D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.

E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions.

F. Openings:

1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.

G. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners, and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall furring-Stud System:

1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:

1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.

4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.

D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing by stud construction.
B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING SHAFT WALL SYSTEM

A. Conform to UL Design No. U438 for two-hour fire rating.
B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
   1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
   2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
B. Concrete slabs on steel decking composite construction:
   1. Use pull down tabs when available.
   2. Use power activated fasteners when direct attachment to structural framing cannot be accomplished.
C. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

D. Existing concrete construction exposed or concrete on steel decking:
   1. Use power actuated fasteners either eye pin, threaded studs, or drive pins for type of hanger attachment required.
   2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.

E. Steel decking without concrete topping:
   1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
   2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.

F. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
   1. Install only for ceilings to receive screw attached gypsum board.
   2. Install in accordance with ASTM C636.
      a. Install main runners spaced 1200 mm (48 inches) on center.
      b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
      c. Install wall track channel at perimeter.

G. Installing Ceiling Bracing System:
   1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and overhead construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
   2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.

3.7 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch.)

C. Level or align ceilings within 3 mm (1/8-inch.)

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical shaft wall assembly.
4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

1. Fire rating test, each fire rating required for each assembly.

2. Sound rating test.

F. Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08.....Application and Finishing of Gypsum Board

C919-08.....Sealants in Acoustical Applications

C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing

C1658-06.....Glass Mat Gypsum Panels

C1396-06.....Gypsum Board

E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise.

B. Coreboard or Shaft Wall Liner Panels.

1. ASTM C1396, Type X.
2. ASTM C1658: Glass Mat Gypsum Panels,
3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.

C. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.3 FASTENERS

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. For fire rated construction, type, and size same as used in fire rating test.

E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides, and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:

1. Two sides of partitions:

a. Fire rated partitions.
b. Smoke partitions.
c. Sound rated partitions.
d. Full height partitions shown (FHP).

2. One side of partitions or furring:
a. Inside of exterior wall furring or stud construction.
b. Room side of room without suspended ceilings.
c. Furring for pipes and duct shafts, except where fire rated shaft wall construction is shown.

3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.

B. In locations other than those specified, extend gypsum board from floor to heights as follows:
1. Not less than 100 mm (4 inches) above suspended acoustical ceilings.
2. At ceiling of suspended gypsum board ceilings.
3. At existing ceilings.

3.2 INSTALLING GYPSUM BOARD

A. Coordinate installation of gypsum board with other trades and related work.

B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.

C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.

D. Use gypsum boards in maximum practical lengths to minimize number of end joints.

E. Bring gypsum board into contact, but do not force into place.

F. Walls (Except Shaft Walls):
1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.

3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Installing Two Layer Assembly Over Sound Deadening Board:
   a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
   b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.

H. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:
1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
3. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.

I. Electrical and Telecommunications Boxes:
1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
   a. Install at all vertical and horizontal external corners and where shown.
   b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
   a. At both sides of expansion and control joints unless shown otherwise.
   b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings, or permanently built-in equipment.
   c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
   d. Where shown.

3.3 INSTALLING GYPSUM SHEATHING

A. Install in accordance with ASTM C840, except as otherwise specified or shown.

B. Use screws of sufficient length to secure sheathing to framing.

C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.

D. Apply 600 mm by 2400 mm (2 foot by 8 foot) sheathing boards horizontally with tongue edge up.

E. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

3.4 CAVITY SHAFT WALL

A. Elevator Shafts:

1. Protrusions including fasteners other than flange of shaft wall framing system or offsets from vertical alignments more than 3 mm (1/8-inch) are not permitted unless shown.
2. Align shaft walls for plumb vertical flush alignment from top to bottom of shaft.

3.5 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for al finished areas open to public view.

B. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.
2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non-decorated fire rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the fire rated construction sanding is not required of non-decorated surfaces.

3.6 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non-decorated surface to provide fire protection equivalent to the fire rated construction.

3.7 UNACCESSIBLE CEILINGS

A. At Mental Health and Behavioral Nursing Units, areas accessible to patients and not continuously observable by staff (e.g., patient bedrooms, day rooms), ceilings should be a solid material such as gypsum board. This will limit patient access. Access doors are needed to access electrical and mechanical equipment above the ceiling. These doors should be locked to prevent unauthorized access and secured to ceiling using tamper resistant fasteners.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustical units.
   2. Metal ceiling suspension system for acoustical ceilings.

B. Comply with references to extent specified in this section.

C. ASTM International (ASTM):
   1. A641/A641M-09a (2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
   2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
   3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   4. C634-13 - Terminology Relating to Environmental Acoustics.
   5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
   7. D1779-98(2011) - Adhesive for Acoustical Materials.
   8. E84-15b - Surface Burning Characteristics of Building Materials.
   9. E119-16 - Fire Tests of Building Construction and Materials.
   10. E413-16 - Classification for Rating Sound Insulation.
   11. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
   12. E1264-14 - Classification for Acoustical Ceiling Products.

D. International Organization for Standardization (ISO):
   1. ISO 14644-1 - Classification of Air Cleanliness.

1.2 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting minimum 30 days before beginning Work of this section.
   1. Required Participants:
      a. Contracting Officer's Representative.
      b. Contractor.
      c. Installer.
      d. Other installers responsible for adjacent and intersecting work, including sprinkler, HVAC and lighting installers.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    a. Installation schedule.
    b. Installation sequence.
    c. Preparatory work.
    d. Protection before, during, and after installation.
    e. Installation.
    f. Terminations.
    g. Transitions and connections to other work.
    h. Inspecting and testing.
    i. Other items affecting successful completion.

1.3 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:
1. Description of each product.
2. Ceiling suspension system indicating manufacturer recommendation for each application.
3. Installation instructions.
4. Warranty.

D. Samples:
1. Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.
    a. Submit quantity required to show full color and texture range.
2. Suspension system, trim and molding, 300 mm (12 inches) long.

E. Certificates: Certify products comply with specifications.
1. Acoustical units, each type.

F. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer.

G. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Regularly manufactures specified products.

2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

1.7 FIELD CONDITIONS

A. Environment:

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Ceiling System: Acoustical ceilings units on exposed grid suspension systems.

2.2 SYSTEM PERFORMANCE

A. Design product complying with specified performance:

1. Maximum Deflection: 1/360of span, maximum.

B. Surface Burning Characteristics: When tested according to ASTM E84.

1. Flame Spread Rating: 25 maximum.
2. Smoke Developed Rating: 450 maximum.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Match Existing

B. Provide acoustical units from one manufacturer.

1. Provide each product exposed to view from one production run.

C. Provide suspension system from same manufacturer.

D. Sustainable Construction Requirements:

1. Mineral Base Recycled Content: 65 percent, total recycled content, minimum.
2. Steel Recycled Content: 30 percent total recycled content, minimum.
3. Aluminum Recycled Content: 80 percent total recycled content, minimum.

2.4 ACOUSTICAL UNITS

A. General:

1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
   a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
   b. Integrally colored units.
2. Classification: Match existing
   a. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55 unless specified otherwise.
   b. CAC (Ceiling Attenuation Class): ASTM E413, 40-44 range unless specified otherwise.
   c. LR (Light Reflectance): Minimum 0.75.
3. Lay-in panels: Sizes as indicated on Drawings, with square edges.

2.5 METAL SUSPENSION SYSTEM

A. General: ASTM C635, intermediate-duty except as otherwise specified.

1. Suspension System: Provide the following:
   a. Galvanized cold-rolled steel, bonderized.
2. Main and Cross Runner: Use same construction Do not use lighter-duty sections for cross runners.

B. Exposed Grid Suspension System: Support of lay-in panels.

1. Grid Width: 22 mm (7/8 inch) minimum with8 mm (5/16 inch) minimum panel bearing surface.
2. Molding: Fabricate from the same material with same exposed width and finish.
3. Finish: Baked-on enamel flat texture finish.
   a. Color: To match adjacent acoustical units unless specified otherwise.

C. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.

1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).

a. Nailing type option for wood forms:
   1) Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
   2) Lower portion provided with minimum 8 mm (5/16 inch) hole to permit attachment of hangers.

b. Flush ceiling insert type:
   1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
   2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
   3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

D. Wire: ASTM A641.
   1. Size:
      a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
      b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

2.6 ACCESSORIES

A. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.
   1. Color Code: Provide the following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water
Orange	Ductwork: Fire Dampers
Blue	Ductwork: Dampers and Controls
Black	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Remove existing acoustical panels suspension system to permit new installation.
   1. Retain existing acoustical panels suspension system for reuse.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.
   1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 ACOUSTICAL UNIT INSTALLATION

A. Applications:
   1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Layout acoustical unit symmetrically, with minimum number of joints.

C. Installation:
   1. Install acoustic tiles after wet finishes have been installed and solvents have cured.
   2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
      a. Install tile to lay level and in full contact with exposed grid.
      b. Replace cracked, broken, stained, dirty, or tile.

D. Touch up damaged factory finishes.
   1. Repair painted surfaces with touch up primer.

3.4 CEILING SUSPENSION SYSTEM INSTALLATION

A. General: Install according to ASTM C636.
   1. Use direct or indirect hung suspension system or combination of both.
   2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
   3. Prevent deflection more than 1/360 of span of cross runner and main runner.
   4. Provide additional hangers located at each corner of support components.
   5. Provide minimum 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams, or joists; and steel beam or bar joist unless furred system is shown.

6. Provide main runners minimum 1200 mm (48 inches) in length.
7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:
   1. Concrete:
      a. Install hanger inserts and wire loops required for support of hanger and bracing wire. Install hanger wires with looped ends through steel deck when steel deck does not have attachment device.
      b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
   2. Steel:
      a. Install carrying channels for attachment of hanger wires.
         1) Size and space carrying channels to support load within performance limit.
         2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported, or deflection exceeds the amount specified.

3.5 CEILING TREATMENT

A. Existing ceiling:
   1. Where extension of existing ceilings occurs, match existing.
   2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
   3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.6 CLEANING

A. Remove excess adhesive before adhesive sets.
B. Clean exposed surfaces. Remove contaminants and stains.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the installation of VCT resilient tile flooring and accessories required for a complete installation.

1.2 RELATED WORK:

A. Subfloor Testing and Preparation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

B. Color, Pattern and Texture for Resilient Tile Flooring and Accessories: See construction documents for basis of design.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Resilient material manufacturer’s recommendations for adhesives, underlayment, primers, and polish.
3. Application, installation, and maintenance instructions.

C. Samples:

1. Tile: Each type, color, thickness, and finish.
2. Edge Strips: Each type, color, thickness, and finish.
3. Feature Strips: Each type, color, thickness, and finish.

D. Shop Drawings:

1. Layout of patterns as shown on the construction documents.
2. Edge strip locations showing types and detail cross sections.

E. Test Reports:

1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.
2. Moisture and pH test results as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.4 DELIVERY:

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged, or opened prior to installation are not acceptable.

1.5 STORAGE:

A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they shall be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

A. Installer Qualifications: A company specializing in installation with minimum three (3) years' experience and employs experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program.

1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
   a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
   b. Career long training.
   c. Manufacturer endorsed training.
   d. Fundamental journeyman skills certification.

B. Furnish product type materials from the same production run.

1.7 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".

1.8 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

D2047-2017.....Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

D2240-2015.....Test Method for Rubber Property—Durometer Hardness

D4078-2015.....Water Emulsion Floor Finish

E648-2019.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-2019.....Specific Optical Density of Smoke Generated by Solid Materials

E1155/E1155M-14.....Determining Floor Flatness and Floor Levelness Numbers

F510/F510M-2020.....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method

F710-2019.....Preparing Concrete Floors to Receive Resilient Flooring

F925-13.....Test Method for Resistance to Chemicals of Resilient Flooring

F1344-2015.....Rubber Floor Tile

F1700-2020.....Solid Vinyl Floor Tile

F1869-2016.....Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

F2170-2019.....Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes

F2195-2018.....Linoleum Floor Tile

C. Code of Federal Regulation (CFR):

40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

D. International Standards and Training Alliance (INSTALL):

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.

B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.

C. Smoke Density: Less than 450 per ASTM E662.

D. Slip Resistance – Not less than 0.5 when tested with ASTM D2047.

2.2 ADHESIVES:

A. Provide water resistant type adhesive for flooring, base and accessories as recommended by the manufacturer to suit substrate conditions. Submit manufacturer’s descriptive data, documentation

stating physical characteristics, and mildew and germicidal characteristics.

B. Provide ventilation during installation. Odor not to be apparent in adjacent SPS area.

2.3 PRIMER FOR CONCRETE SUBFLOORS:

A. Provide in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.4 LEVELING COMPOUND FOR CONCRETE FLOORS:

A. Provide cementitious products with latex or polyvinyl acetate resins in the mix in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.5 POLISH AND CLEANERS:

A. Cleaners: As recommended in writing by floor tile manufacturer.

B. Polish: ASTM D4078.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directly by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

B. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry, and cured.

3.2 SUBFLOOR TESTING AND PREPARATION:

A. Prepare and test surfaces to receive resilient tile and adhesive as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1. Remove existing resilient floor and existing adhesive.

B. Prepare concrete substrates in accordance with ASTM F710.

3.3 INSTALLATION:

A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.

B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.

C. Tile Layout:

1. If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned.
2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.
3. Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.

D. Application:

1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
4. Roll tile floor with a minimum 45 kg (100 pound) roller.

E. Seal joints at pipes with sealants in accordance with Section 07 92 00, JOINT SEALANTS.

F. Installation of Edge Strips:

1. Locate edge strips under center line of doors unless otherwise shown on construction documents.
2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws.
3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION:

A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.

B. Keep traffic off resilient material for a minimum 72 hours after installation.

C. Clean flooring as recommended in accordance with manufacturer’s printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer’s written instructions.

D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.

E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and moldings, re-clean resilient materials.

3.5 LOCATION:

A. Unless otherwise indicated in construction documents, install tile flooring, under areas where casework, laboratory and pharmacy furniture and other equipment occur.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, the following:

1. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged, or rusted prime coats applied by others.
2. Painting ferrous metal (except stainless steel) exposed to view.
3. Painting galvanized ferrous metals exposed to view.
4. Painting gypsum drywall exposed to view.
5. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Painter qualifications.

C. Manufacturer's Literature and Data:

1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, shall be used to determine compliance with the submittal requirements of this specification. The Contractor shall choose to use subsequent MPI "Approved Product List", however, only one (1) list shall be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate shall be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

D. Manufacturers' Certificates indicating compliance with specified requirements:

1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
2. Epoxy coating.

1.3 DELIVERY AND STORAGE:

A. Deliver materials to site in manufacturer's sealed container marked to show following:
   1. Name of manufacturer.
   2. Product type.
   3. Batch number.
   4. Instructions for use.
   5. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:
   1. Federal Specification Number, where applicable, and name of material.
   2. Surface upon which material is to be applied.
   3. Specify Coat Types: Prime; body; finish.

C. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat, and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

D. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

1.4 QUALITY ASSURANCE:

A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.

B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints shall be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer

Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

1.5 REGULATORY REQUIREMENTS:

A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.

1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
2. Lead-Based Paint:
   a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
   b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
   c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
3. Asbestos: Provide materials that do not contain asbestos.
4. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
5. Use high performance acrylic paints in place of alkyd paints.

1.6 SAFETY AND HEALTH

A. Apply paint materials using safety methods and equipment in accordance with the following:

1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA). The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.

C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

1. The applicable manufacturer’s Material Safety Data Sheets (MSDS) or local regulation.

2. 29 CFR 1910.1000.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. American Conference of Governmental Industrial Hygienists (ACGIH):

ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

ACGIH TLV-DOC-2012......Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

C. ASME International (ASME):

A13.1-07(R2013).........Scheme for the Identification of Piping Systems

D. Code of Federal Regulation (CFR):

40 CFR 59...............Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

E. Commercial Item Description (CID):

A-A-1272A...............Plaster Gypsum (Spackling Compound)

F. Federal Specifications (Fed Spec):

TT-P-1411A..............Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

G. Society for Protective Coatings (SSPC):

SSPC SP 1-82(R2004).....Solvent Cleaning

SSPC SP 2-82(R2004).....Hand Tool Cleaning

SSPC SP 3-28(R2004).....Power Tool Cleaning

SSPC SP 10/NACE No.2....Near-White Blast Cleaning

SSPC PA Guide 10........Guide to Safety and Health Requirements

H. Maple Flooring Manufacturer’s Association (MFMA):

I. U.S. National Archives and Records Administration (NARA):

29 CFR 1910.1000........Air Contaminants

J. Underwriter’s Laboratory (UL)

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer’s technical data sheets for specified coatings and solvents.

2.2 PAINT PROPERTIES:

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only to recommended limits.

D. VOC Content: For field applications that are inside the weatherproofing system, paints, and coating to comply with VOC content limits of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling, and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day’s work.

B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
   a. Less than 3 degrees C (5 degrees F) above dew point.
   b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.

c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces, unless otherwise permitted by the paint manufacturer's printed instructions.

2. Maintain interior temperatures until paint dries hard.

3.2 INSPECTION:

A. Examine the areas and conditions where painting and finishing shall be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

A. Application shall be by brush or roller. Spray application only upon acceptance from the COR in writing.

B. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass, and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.

C. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in place protection. Upon completion of each space, carefully replace all removed items by workers skilled in the trades involved.

D. Materials shall be applied under adequate illumination, evenly spread, and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.

E. Apply materials with a coverage to hide substrate completely. When color, stain, dirt, or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance, and coverage, at no additional cost to the Government.

F. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.

G. All suction spots or "hot spots" in plaster after the application of the first coat shall be touched up before applying the second coat.

H. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.4 SURFACE PREPARATION:

A. General:

1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be completely dry, clean, and smooth.
3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process shall not fall in wet, newly painted surfaces.
5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   a. Gypsum Board: 12 percent.

B. Ferrous Metals:

1. Remove oil, grease, soil, drawing and cutting compounds, flux, and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blowholes). Finish flush with adjacent surfaces.
   a. Fill flat head countersunk screws used for permanent anchors.
   b. Do not fill screws of item intended for removal such as glazing beads.

4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

C. Zinc-Coated (Galvanized) Metal, Aluminum, Surfaces Specified Painted:
1. Clean surfaces to remove grease, oil, and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer) depending on finish coat compatibility.

D. Gypsum Plaster and Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.5 PAINT PREPARATION:

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.

B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.

C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.

D. Mix two (2) component and two (2) part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.

E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 APPLICATION:

A. Start of surface preparation or painting shall be construed as acceptance of the surface as satisfactory for the application of materials.

B. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.

C. Apply each coat evenly and cover substrate completely.

D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.

E. Apply by brush or roller. Spray application for new or existing occupied spaces only upon approval by acceptance from COR in writing.

1. Apply painting materials specifically required by manufacturer to be applied by spraying.
2. In new construction and in existing occupied spaces, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in “Building and Structural Work Field Painting”; “Work not Painted”; motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.

F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.7 PRIME PAINTING:

A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.

D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.

E. Metals except boilers, incinerator stacks, and engine exhaust pipes:

1. Steel and iron: MPI 79 (Marine Alkyd Metal Primer). Use MPI 101 (Cold Curing Epoxy Primer) where finish is specified.
2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer) .
3. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel).

F. Gypsum Board:

1. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) in shower and bathrooms.

3.8 INTERIOR FINISHES:

A. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
   a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) unless specified otherwise.

B. Gypsum Board:

1. One (1) coat of MPI 45 (Interior Primer Sealer) plus one (1) coat of MPI 139 (Interior High Performance Latex, MPI Gloss level 3).

3.9 REFINISHING EXISTING PAINTED SURFACES:

A. Clean surface to receive new paint.

B. Remove and reinstall items as specified under “General Workmanship Requirements”.

C. Remove existing finishes or apply separation coats to prevent non-compatible coatings from having contact.

D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

G. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.

3.10 PAINT COLOR:

A. Color and gloss of finish coats to be selected by the VA.

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high. If not ceiling label partitions at 8’-0” a.f.f. or higher.
2. Stenciled message: "SMOKE BARRIER" or "FIRE BARRIER" as applicable.
3. Locate not more than 6096 mm (20 feet) on center on corridor sides of partitions, and with a least one (1) message per room on room side of partition.
4. Use semi-gloss paint of color that contrasts with color of substrate.

3.11 PROTECTION CLEAN UP, AND TOUCH-UP:

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers wall mounted exposed fire extinguishers.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.3 APPLICATION PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Testing and Materials (ASTM):
D4802-15.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER

A. To be provided by VA, provide blocking in wall to attach wall mount bracket which supports exposed fire extinguisher. Coordinate with COR, mounting height as per applicable codes.

PART 3 - EXECUTION

A. Install blocking in wall to attach wall mount bracket which supports exposed fire extinguisher in accordance with manufacturer's instructions. Coordinate type and size of extinguisher with COR.

B. Install blocking so that extinguisher height meets the requirements of NFPA 10

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SECTION 13 05 41
SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

PART 1 – GENERAL

1.1 DESCRIPTION:

A. Provide seismic restraint in accordance with the requirements of this section to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event. The new 2 hour partition walls in the penthouse will conform to this section.

B. The design to resist seismic load shall be based on Seismic Design Categories per section 4.0 of the VA Seismic Design Requirements (H-18-8) dated November 2019: http://www.cfm.va.gov/til/etc/seismic.pdf

C. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:

1. Architectural Elements: Nonbearing partitions and suspended ceilings.
2. Electrical Elements: Power and lighting systems; motor controller panels; fire protection and alarm systems; telephone and communication systems.
3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems; boiler equipment and components.
4. Transportation Elements: Mechanical, electrical, and structural elements for transport systems, i.e., elevators and dumbwaiters, including hoisting equipment and counterweights.

1.2 RELATED WORK:

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 07 84 00, FIRESTOPPING.

C. Section 07 92 00, JOINT SEALANTS.

D. Section 22 05 11 COMMON WORK RESULTS FOR PLUMBING

E. Section 22 05 23 GENERAL DUTY VALVES FOR PLUMBING PIPING

F. Section 22 07 11 PLUMBING INSULATION

G. Section 23 05 11 COMMON WORK RESULTS FOR HVAC

H. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION.

I. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

J. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING

K. Section 23 23 00, REFRIGERANT PIPING

L. Section 23 31 00 HVAC DUCTS AND CASINGS

M. Section 26 05 11 REQUIREMENTS FOR ELECTRICAL INSTALLATION

N. Section 26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

O. Section 26 51 00 INTERIOR LIGHTING

1.3 QUALITY CONTROL:

A. Shop-Drawing Preparation:

1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the state where the project is located.
2. Submit design tables and information used for the design-force levels, stamped, and signed by a professional structural engineer registered in the State where project is located.

B. Coordination:

1. Do not install seismic restraints until seismic restraint submittals are approved by the Contracting Officers Representative (COR).
2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

C. Seismic Certification:

In structures assigned to IBC Seismic Design Category C, D, E, or F, permanent equipment and components are to have Special Seismic Certification in accordance with requirements of section 13.2.2 of ASCE 7 except for equipment that are considered rugged as listed in section 2.2 OSHPD code application notice CAN No. 2-1708A.5 and shall comply with section 13.2.6 of ASCE 7.

1.4 SUBMITTALS:

A. Submit a coordinated set of equipment anchorage drawings prior to installation including:

1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, and welds. clearly identified and specified.

3. Numerical value of design seismic brace loads.
4. For expansion bolts, include design load and capacity if different from those specified.

B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:
1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated).
3. Pipe contents.
4. Structural framing.
5. Location of all gravity load pipe supports and spacing requirements.
6. Numerical value of gravity load reactions.
7. Location of all seismic bracing.
8. Numerical value of applied seismic brace loads.
9. Type of connection (Vertical support, vertical support with seismic brace).
10. Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.

C. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:
1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
3. Maximum spacing of hangers and bracing.
4. Seal of registered structural engineer responsible for design.

D. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.

E. Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

1.5 APPLICABLE PUBLICATIONS:

A. The Publications listed below (including amendments, addenda revisions, supplements, and errata) form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

355.2-07.....Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary

C. American Institute of Steel Construction (AISC):

Load and Resistance Factor Design, Volume 1, Second Edition

D. American Society for Testing and Materials (ASTM):

A36/A36M-08.....Standard Specification for Carbon Structural Steel

A53/A53M-10.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A307-10.....Standard Specification for Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength.

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A325M-09.....Standard Specification for High-Strength Bolts for Structural Steel Joints [Metric]

A490-10.....Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

A490M-10.....Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]

A500/A500M-10.....Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

A501-07.....Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

A615/A615M-09.....Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

A992/A992M-06.....Standard Specification for Steel for Structural Shapes for Use in Building Framing

A996/A996M-09.....Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement

E488-96(R2003).....Standard Test Method for Strength of Anchors in Concrete and Masonry Element

E. American Society of Civil Engineers (ASCE 7) Latest Edition.

F. International Building Code (IBC) Latest Edition

G. VA Seismic Design Requirements, H-18-8, November 2019

H. National Uniform Seismic Installation Guidelines (NUSIG)

I. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum

1.6 REGULATORY REQUIREMENT:

A. IBC Latest Edition.

B. Exceptions: The seismic restraint of the following items shall be omitted:

1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
3. All other piping less than 2 ½ inches inside diameter, except for automatic fire suppression systems.
4. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
5. All electrical conduits, less than 2 ½ inches inside diameter.
6. All rectangular air handling ducts less than six square feet in cross sectional area.
7. All round air handling ducts less than 28 inches in diameter.
8. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

PART 2 – PRODUCTS

2.1 STEEL:

A. Structural Tubing: ASTM A500, Grade B.

B. Structural Tubing: ASTM A501.

C. Steel Pipe: ASTM A53/A53M, Grade B.

D. Bolts & Nuts: ASTM A307.

2.2 CAST-IN-PLACE CONCRETE:

A. Concrete: 28 day strength, f'c = 25 MPa (3,000 psi)

B. Reinforcing Steel: ASTM A615/615M or ASTM A996/A996M deformed.

PART 3 – EXECUTION

3.1 CONSTRUCTION, GENERAL:

A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.

B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.

C. Construct seismic restraints and anchorage to allow for thermal expansion.

D. Testing Before Final Inspection:

1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.
2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3.2 EQUIPMENT RESTRAINT AND BRACING:

A. See drawings for equipment to be restrained or braced.

3.3 MECHANICAL DUCTWORK AND PIPING,CONDUITS AND TELECOMMUNICATION WIRES

A. Support and brace mechanical ductwork and piping; electrical busways, conduits, and cable trays; and telecommunication wires and cable trays to resist directional forces (lateral, longitudinal and vertical).

B. Brace duct and breeching branches with a minimum of 1 brace per branch.

C. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which shall not displace sufficiently to damage adjacent or connecting equipment or building members.

D. Seismic Restraint of Piping:

1. Design criteria:

a. Piping resiliently supported: Restrain to support 120 -percent of the weight of the systems and components and contents.

E. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.

3.4 PARTITIONS

A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.

B. Properly anchor masonry walls to the structure for restraint, so as to carry lateral loads imposed due to earthquake along with their own weight and other lateral forces.

3.5 CEILINGS AND LIGHTING FIXTURES

A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.

B. Independently support and laterally brace all lighting fixtures. Refer to applicable portion of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

3.7 STORAGE RACKS OR EQUIPMENT

A. Install storage racks or Equipment to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.

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SECTION 14 12 11
TRACTION CARTLIFT
NRM PROJECT 501-19-101
BUILDING #41 CART LIFT #T-4

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the engineering, furnishing, and installation of the complete basement traction cart lift system as described herein and as indicated on the drawings.

B. Items listed in the singular apply to each cart lift in this specification except where noted.

C. Floor Loading Cart lift with a maximum platform size of 15 square feet and maximum capacity of 1000 pounds shall be basement geared traction microprocessor controller, AC VVVF motor control, with central station dispatching, signal system, and car leveling device.

D. Manually loading and unloading with power operated car and hoistway doors.

CARTLIFT SCHEDULE	
Cart lift Number	T-4
Overall Platform Size	3’4” W x 5’0” D
Rated Load - kg(lb)	1000 lbs.
Contract Speed - m/s(fpm)	50
Total Travel -	36’ 0” field verify
Number of Stops	2
Number of Openings	2
Type of Roping	1 to 1
Entrance Size and Type	3’0” W x 6’8” H

1.2 RELATED WORK

A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.

C. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.

D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.

E. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.

F. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

G. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.

H. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.

I. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.

J. Section 26 24 16, PANELBOARDS: Low voltage panelboards.

K. Section 26 43 13, TRANSIENT-VOLTAGE SURGE SUPPRESSION: Surge suppressors installed in panelboards.

L. Section 26 51 00, INTERIOR LIGHTING: Fixture and ballast type for interior lighting.

1.3 QUALIFICATIONS

A. Approval by the Contracting Officer is required for products and services of proposed manufacturers, suppliers and installers and shall be contingent upon submission of certificates by the Contractor stating the following:

1. Car lift contractor is currently and regularly engaged in the installation of car lift equipment as one of his principal products.
2. Cart lift contractor shall have three years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
3. Mechanic (Installer) shall have passed a Mechanic Examination approved by the U.S. Department of Labor and have technical qualifications of at least five years of experience in the elevator industry or 10,000 hours of field experience working in the elevator industry with technical update training. Apprentices shall be actively pursuing Certified Elevator Mechanic status. Certification shall be submitted for all workers employed in this capacity.

B. Approval of Cart lift Contractor’s equipment will be contingent upon their identifying a maintenance service provider that shall render services within two hours of receipt of notification, together with certification that the quantity and quality of replacement parts stock

is sufficient to warranty continued operation of the cart lift installation.

C. Approval will not be given to contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record for unsatisfactory installations, have failed to complete awarded contracts within the contract period, and do not have the requisite record of satisfactorily performing installations of similar type and magnitude.

D. Equipment within a group of cart lifts shall be the product of the same manufacturer.

E. The Contractor shall provide and install safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

F. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS Dl.1 to perform the type of work required. Certificates shall be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and shall be obtained from the VAMC safety department. Request permit one day in advance.

G. Electrical work shall be performed by a Licensed Master Electrician and Licensed Journeymen Electricians as requirements by NEC. Certificates shall be submitted for all workers employed in this capacity.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification. Car lift installation shall meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.

B. Federal Specifications (Fed. Spec.):

J-C-30B.....Cable and Wire, Electrical (Power, Fixed Installation)

J-C-580.....Cord, Flexible, and Wire, Fixture

W-S-610.....Splice Connectors

W-C-596F.....Connector, Plug, Electrical; Connector, Receptacle, Electrical

W-F-406E.....Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible

HH-I-558C.....Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)

W-F-408E.....Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-wall Type)

RR-W-410.....Wire Rope and Strand

TT-E-489J.....Enamel, Alkyd, Gloss, Low VOC Content

QQ-S-766.....Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip

C. American Society of Mechanical Engineers (ASME):

A17.1.....Safety Code for Elevators and Escalators

A17.2.....Inspectors Manual for Electric Elevators and Escalators

D. National Fire Protection Association:

NFPA 13.....Standard for the Installation of Sprinkler Systems

NFPA 70.....National Electrical Code (NEC)

NFPA 72.....National Fire Alarm and Signaling Code

NFPA 101.....Life Safety Code

NFPA 252.....Fire Test of Door Assemblies

E. International Building Code (IBC)

F. American Society for Testing and Materials (ASTM):

A1008/A1008M-09.....Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability

E1042-02.....Acoustically Absorptive Materials Applied by Trowel or Spray

G. Society of Automotive Engineers, Inc. (SAE)

J517-91.....Hydraulic Hose, Standard

H. Gauges:

Sheet and Plate: U.S. Standard (USS)

Wire: American Wire Gauge (AWG)

I. American Welding Society (AWS):

D1.1.....Structured Welding Code Steel

J. National Electrical Manufacturers Association (NEMA):

LD-3.....High-Pressure Decorative Laminates

K. Underwriter's Laboratories (UL):

486A.....Safety Wire Connectors for Copper Conductors

797.....Safety Electrical Metallic Tubing

L. Institute of Electrical and Electronic Engineers (IEEE)

M. VA Seismic Design Manual H-18-8

1.5 SUBMITTALS

A. Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related cart lift material shall be forwarded to the Contracting Officer.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each and every cart lift unit specified including:
   a. Hoisting machine, controller, governor, power conversion devices, and all other components located in machine room.
   b. Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, size of car platform, and car frame members.
   c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with VA Seismic Design Manual H-18-8.
   d. Reactions at points of supports and buffer impact loads.
   e. Weights of principal parts.
   f. Top and bottom clearances and over travel of car and counterweight.
   g. Location of circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.
2. Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.
   a. If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.

b. Sill details including sill support.

D. Samples:

1. One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).
2. No other samples of materials specified shall be submitted unless specifically requested after submission of manufacturer's name.

E. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the cart lift layouts:

1. Hoisting machine.
2. Hoisting machine motor, HP rating, and RPM.
3. Controller.
4. Starters and overload current protection devices.
5. Car and counterweight safety devices; maximum and minimum rated loads and rated speeds.
6. Hoistway door interlocks.
7. Car and counterweight buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.
8. Hoist ropes; ultimate breaking strength, allowable working load, and actual working load.

F. Complete construction drawings of cart lift enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, and location of car equipment.

G. Complete dimensioned detail of vibration-isolating foundation for traction hoisting machine.

H. Dimensioned drawings showing details of:

1. All signal and operating fixtures.
2. Car and counterweight slide guides.
3. Hoistway door tracks, hangers, and sills.

I. Cuts or drawings showing details of controller.

1.6 WIRING DIAGRAMS

A. Provide three complete sets of paper and one electronic set field wiring and straight-line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the cart lift machine room as directed by the Resident Engineer.

B. In the event field modifications are necessary during installation, diagrams shall be revised to include all corrections made prior to and

during the final inspection. Corrected diagrams shall be delivered to the Resident Engineer within thirty (30) days of final acceptance.

C. Provide the following information relating to the specific type of microprocessor controls installed:
   1. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
   2. System logic description.
   3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
   4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

1.7 PERFORMANCE STANDARDS

A. The cart lift shall meet the highest standards of the industry and specifically the following:
   1. Contract speed is high speed in either direction of travel with rated capacity load in the cart lift. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
   2. Starting, stopping, and leveling shall be smooth without appreciable steps of acceleration and deceleration.

B. Car lift control system shall be capable of starting the car without noticeable "roll-back" of hoisting machine sheave, regardless of load condition in car, location of car, or direction of travel.

C. Floor level stopping accuracy shall be within 3 mm (.125 in.) above or below the floor, regardless of load condition.

D. Noise and Vibration Isolation: All cart lift equipment including their supports and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

E. Sound Isolation: Noise level relating to cart lift equipment operation in machine room shall not exceed 80 db. All db readings shall be taken three (3) feet off the floor and three (3) feet from equipment.

F. Airborne Noise: Measured noise level of cart lift equipment during operation shall not exceed 50 db in cart lift lobbies under any condition including door operation.

1.8 WARRANTY

A. Submit all labor and materials furnished in connection with car lift system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The one-year Warranty shall commence after final inspection, completion of performance test, and upon full acceptance of the installation and run concurrent with the guarantee period of service.

B. During warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, device shall be removed and a new device meeting all requirements shall be installed as part of work until satisfactory operation of installation is obtained. Period of warranty shall start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

1.9 POWER SUPPLY

A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.

B. Surge Suppressors to protect the elevator equipment.

1.10 EMERGENCY POWER SUPPLY

A. Emergency power supply, its starting means, transfer switch for transfer of elevator supply from normal to emergency power, two pair of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Controller Manufacturer) to terminals in the group elevator controller and other related work shall be provided by the Electrical Contractor.

B. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device.

1.11 ELEVATOR MACHINE ROOM AND MACHINE SPACE

A. Retain existing machine room and provide for a code compliant machine room that meets the requirements of ASME A17.1, NEC, and IBC. Coordinate with Architectural Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and surfaces shall be smooth and without waves. During installation all stainless-steel surfaces shall be protected with suitable material.

B. Where cold rolled steel is specified, it shall be low-carbon steel rolled to stretcher leveled standard flatness, complying with ASTM A109.

2.2 MANUFACTURED PRODUCTS

A. Materials, devices, and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. The cart lift equipment including controllers, door operators, and supervisory system shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.

B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit. Components shall be compatible with each other and with the total assembly for the intended service.

C. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.

D. If key operated switches are furnished in conjunction with component of this elevator installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each key shall have a tag bearing a stamped or etched legend identifying its purpose.

2.3 CONDUIT AND WIREWAY

A. Install electrical conductors, except traveling cable, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than 18.75 mm (.75 in.) or electrical metallic tubing smaller than 12.5 mm (.50 in.) electrical trade size shall not be used. All raceways completely embedded in concrete slabs,

walls, or floor fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the cart lift machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 9.375 mm (.375 in.) electrical trade size may be used, not exceeding 45 cm (18 in.) in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

B. All conduits terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.

C. Rigid conduit and EMT fittings using set screws or indentations as a means of attachment shall not be used.

D. Connect motor or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

2.4 CONDUCTORS

A. Conductors shall be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets. Tap connectors may be used in wireways provided they meet all UL requirements.

B. Provide all conduit and wiring between machine room, hoistway and fixtures.

C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.

D. Where size of conductor is not given, voltage and amperes shall not exceed limits set by NEC.

E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.

F. Terminal connections for all conductors used for external wiring between various items of elevator equipment shall be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Cart lift Contractor may, at his option, make these terminal connections on #10 gauge or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

2.5 TRAVELING CABLES

A. All conductors to the car shall consist of flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks shall have permanent indelible identifying numbers for each connection. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.

E. If traveling cables come into contact with the hoistway or cart lift due to sway or change in position, provide shields or pads to the cart lift and hoistway to prevent damage to the traveling cables.

D. Hardware cloth may be installed from the hoistway suspension point to the cart lift pit to prevent traveling cables from rubbing or chafing

and securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

2.6 CONTROLLER AND SUPERVISORY PANEL

A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches, and relays on a steel frame in a NEMA Type 1 General Purpose Enclosure. Cabinet shall be securely attached to the building structure.

B. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controller and supervisory panel shall be neatly formed, laced, and identified.

2.7 MICROPROCESSOR CONTROL SYSTEM

A. Provide a microprocessor control system to control dispatching, signal functions, and VVVF Drive for hoist motor control. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval. Add Regenerative Drive when economically advantages to the VA.

B. Controller manufacturer shall provide factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA’s designated Elevator Maintenance Service Provider.

2.8 CALL AND SEND OPERATION

A. Car shall be dispatched from landing by power operated car and hoistway door and pressing call button for the landing corresponding to floor to be served, provided interlocked circuits have been established.

B. Car shall be called to such landing by pressing button at floor to be served and shall proceed to destination.

C. Doors shall be power operated after car has stopped at landing.

D. Landing push buttons shall be ineffective during travel of car through hoistway and for an adjustable time after car has stopped to allow manual opening of doors.

2.9 CORRIDOR OPERATING STATIONS

A. Operating stations and control panel shall be stainless steel, flush mounted in or adjacent to the hoistway entrances.
   1. All faceplates shall have edges beveled at 15 degrees.
   2. Fasten all faceplates with non-corrosive stainless steel tamperproof screws.
   3. Each switch and operating device shall have indelible, 6 mm (1/4 in.) high legends to indicate its identity and position.

B. Provide each floor served by cart lift with a complete set of operating push buttons with 13 mm (.5 in.) numbers in the face of the button corresponding to the floors served. Push buttons shall not protrude beyond the faceplate when in normal position. Call register lights shall be LED illuminated located in the buttons. Illuminate the floor numeral corresponding to the call registered. Provide an "In Use" light in the panels to show when cart lift is in operation, or the door is open.

C. Provide car lift with a control panel at the makeup area and as shown on drawings, containing the following:
   1. Key operated "ON/OFF" service switch.
   2. Call and Send buttons to upper floors.
   3. A red LED illuminated indicator light to indicate a malfunction in the system.

2.10 CORRIDOR LANTERN/POSITION INDICATOR

A. Provide each car with combination corridor lantern/position indicator digital display mounted over the hoistway entrances at each and every floor. Each lantern shall contain a single stroke chime so connected that when the cart lift arrives at a landing, the chime shall sound momentarily. The lenses in each lantern shall be red, LED illuminated. Lanterns shall signal in advance of cart lift arrival at the landing. Audible signal shall not sound when a cart lift passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.

B. Provide alpha-numeric digital position indicators directly over hoistway landing entranceways between the arrival lanterns at each and every floor. Indicator faceplate shall be stainless steel. Numerals shall be not less than 25 mm (1 in.) high. Cover plates shall be readily removable for re-lamping.

C. Provide LED illumination to indicate the position and direction the cart lift is traveling by illuminating the proper alpha-numeric symbol. When the cart lift is standing at a landing without direction established, arrows shall not be illuminated.

2.11 MACHINE BEAMS

A. Retain existing structural steel beams, required to support hoist machine, deflector sheaves, overhead sheaves, and rope dead-end hitch assemblies.

B. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.

C. Provide hold-down bolts for offset hoist machines located beside or at bottom of hoistway where concrete hold-down pad is provided.

2.12 BASEMENT GEARED TRACTION

A. The geared traction machine for car lift shall be single worm and gear, single-wrap traction type, with AC motor, spring applied and electrically released brake, sheave, pedestal mounted in proper alignment on a sound isolated steel plate. Mount machine in top or bottom of hoistway.

B. Hoisting motor shall be rated for 50 degrees C. rise, 60-minute duty, and have sufficient capacity to operate cart lift with rated load at rated speed without overheating.

C. Furnish vibration isolating machine foundation for machines mounted over the hoistway. Isolation foundation shall prevent the transmission of machine vibration and sound to the building structure. Location and deflection characteristics of the isolation units shall produce uniform and non-excessive loading on the units under all operating conditions. The foundation shall incorporate positive means to prevent lateral displacement in any direction of the machine.

D. Furnish vibration isolating machine foundation for machines mounted over the hoistway. Isolation foundation shall prevent the transmission of machine vibration and sound to the building structure. Location and deflection characteristics of the isolation units shall produce uniform and non-excessive loading on the units under all operating conditions. The foundation shall incorporate positive means to prevent lateral displacement in any direction of the machine.

2.13 SHEAVES

A. Provide new deflector sheaves with a metal basket type guard mounted below the sheave and a guard to prevent ropes from jumping out of grooves. Securely fasten guard to sheave support beams.

B. Two-to-one idler sheaves on car and counterweight, if used, shall be provided with metal guards that prevent foreign objects from falling between ropes and sheave grooves and to prevent ropes from jumping out of grooves.

C. Securely mount overhead sheaves on overhead beams in proper alignment with basement traction sheave, car and counterweight rope hitches or sheaves. Provide blocking beams where sheaves are installed on two or more levels.

2.14 HOIST ROPES

A. Provide cart lift with the required number and size of ropes to insure adequate traction and required safety factor. Ropes shall be traction steel conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.25 inch.

B. Ends of hoisting ropes shall be turned back and fastened with U-bolt clamps or shackled to permit tension in ropes to be equalized.

C. Where hoisting ropes pass around sheaves on car and counterweight, provide a suitable guard on each sheave to prevent the ropes from jumping out of grooves.

D. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on top of the cart lift.

2.15 CAR SAFETY DEVICE

A. Provide Type “A” Safeties on the cart lift.

2.16 CAR AND COUNTERWEIGHT BUFFERS

A. Provide one spring buffer for each car and one for each counterweight. Buffers and supports shall be securely fastened to the pit channels, and in the alignment with striker plates. Every installed buffer shall have a permanently attached metal plate showing stroke and loading rating. Buffer anchorage shall not puncture pit waterproofing.

B. Buffers shall be designed and installed to provide minimum car runby.

C. Pipe stanchions and struts shall be furnished, as required, to properly support the buffer.

2.17 COUNTERWEIGHT

A. Cart lift shall be counterweighted to the extent of the weight of the car plus 40-50 percent of the rated capacity load, as required by controller manufacturer.

B. Furnish two (2) tie rods with cotter pins and double nuts at top and bottom. Install set collars or other approved means on tie rods to prevent counterweight sub-weights from jumping and/or rattling. Both ends of tie-rods shall be visible and accessible.

2.18 CAR AND COUNTERWEIGHT GUIDES

A. Provide new on car and counterweight frame four sliding guide shoes each assembled, to permit individual self-alignment to the guide rails.

B. Provide each shoe with renewable non-metallic gibs having low coefficient of friction and long-wearing qualities to operate on guide rails receiving light applications of rail lubricant. Gibs containing graphite or other solid lubricants are not acceptable.

C. Flexible guide shoes of approved design, other than swivel type, may be used provided they are self-aligning on all three faces of the guide rails.

2.19 GUIDE RAILS, SUPPORTS, AND FASTENINGS RETAIN EXISTING

A. Guide rails for car and counterweight shall be “Channel” type provided by the cart lift manufacturer or planed steel “T-rails” and weigh 12 kg/m (8 lbs/ft).

B. Securely fasten guide rails to the brackets or other supports by heavy duty steel rail clips.

C. Provide necessary rail brackets of sufficient size and design to secure substantial rigidity to prevent spreading or distortion of rails under any condition.

D. Guide rails shall extend from channels on pit floor to within 75 mm (3 in.) of the underside of the concrete slab or grating at top of hoistway with a maximum deviation of 3 mm (.125 in.) from plumb in all directions. Provide a minimum of 19 mm (.75 in.) clearance between bottom of rails and top of pit channels.

E. Guide rail anchorages in pit shall be made in a manner that will not reduce effectiveness of the pit waterproofing.

F. In the event inserts or bond blocks are required for the attachment of guide rails, the Contractor shall furnish inserts or bond blocks and shall install them in the forms before the concrete is poured. Use

inserts or bond blocks only in concrete or block work where steel framing is not available for support of guide rails.

G. Guide rails shall be clean and free of any signs of rust, grease, or abrasion before final inspection. Paint the shank and base of the T-section with one field coats of manufacturer's standard enamel.

2.20 NORMAL AND FINAL TERMINAL STOPPING DEVICES

A. Mount terminal slowdown switches and direction limit switches on the elevator or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.
   1. Switches shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.
   2. Switches, when opened, shall permit operation of elevator in reverse direction of travel.

B. Mount final terminal stopping switches in the hoistway.
   1. Switches shall be positively opened should the car travel beyond the terminal direction limit switches.
   2. Switches shall be independent of other stopping devices.
   3. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake, and prevent operation of car in either direction.

2.21 CROSSHEAD DATA PLATE AND CODE DATA PLATE

A. Permanently attach a non-corrosive metal Data Plate to car crosshead.

B. Permanently attach a Code Data Plate, in plain view, to the controller.

2.22 LEVELING DEVICE

A. Car shall be equipped with a leveling/stopping device to automatically bring the car to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction.

B. If the car stops short or travels beyond the floor, the leveling device, within its zone shall automatically correct this condition and maintain the car within 3 mm (.125 in.) of level with the floor landing regardless of the load carried.

2.23 EMERGENCY STOP SWITCHES

A. Provide an emergency stop switch, push to stop/pull to run, for each cartop, pit, and machine space. Mount stop switch in the pit adjacent to pit access door.

B. Each stop switch shall be red in color and shall have "STOP" and "RUN" positions legibly and indelibly identified.

2.24 HOISTWAY ACCESS SWITCHES

A. Provide hoistway access switches for car lift at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Mount the access key switch and the "On/Off" access enabled switches in the top and bottom corridor hall stations next to the hoistway entrance jamb.

B. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions.

C. Each access switch shall be a constant pressure lock with key removable only in the "OFF" position.

D. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center.

E. Arrange the hoistway switch to initiate and maintain movement of the car. When the cart lift is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor.

F. Provide emergency access for all hoistway entrances, locked door release system (key access) for car lifts.

2.25 HOISTWAY ENTRANCES PROVIDE NEW

A. Entrances shall be the manufacturers' standard size with bi-parting or vertical sliding doors.

B. Frame shall be not less than No. 16-gauge stainless steel, coated inside, with 4.8 mm (.1875 in.) thick sound isolation mastic compound, assembled with smoothly dressed welded joints at the corners. Sill shall be rigidly anchored and not less than No. 12-gauge stainless steel and shall be set true, straight and level, with hoistway edges plumb over each other.

C. Weight of the frames and method of fastening to hoistway wall shall conform to standard practice of car lift manufacturer. Provide gibs, struts, chains, and steel sheaves with sealed ball or roller bearings. Provide guides and stops for door travel.

D. Door panels shall be flush hollow metal construction and bear a 1.5-hour Underwriters' "B" label, according to NFPA 252, 25 mm (1 in.)

thick, of not less than 16-gauge stainless steel on both sides. Panels shall be reinforced. Interior of panels shall be filled with fireproof material. Upper door section shall be fitted with a neoprene non-movable minimum diameter one-inch door astragal. A hand pull shall be secured to the upper door section. Door guides shall be non-corrosive metal.

E. The top section of the door panel shall be equipped with a glass vision panel of 6 mm (.25 in.) thick wire glass not less than 75 mm (3 in.) or more than 100 mm (4 in.) in diameter.

F. Equip each hoistway door with an electrical/mechanical interlock, functioning as hoistway unit system, to prevent operation of car until all doors are locked in the closed position unless car is operating in leveling zone or hoistway access switch is used.

G. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.

2.26 CAR FRANE PROVIDE NEW

A. Construct car frames of structural shapes, ASTM A-36, rigidly bolted and/or welded together of adequate strength to support car with rated load.

B. Provide a bonding wire between frame and platform.

2.27 CAR ENCLOSURE PROVIDE NEW

A. Car shall have width and depth required for contract load and is constructed of minimum 14-gauge stainless steel except car bottom shall be minimum 10-gauge stainless steel. Car bottom shall be arranged and reinforced to provide adequate support for loading and unloading unit.

1. Provide car entrance with vertical sliding or bi-parting door constructed of sheet panels of stainless steel, guided and connected to each other by cables or chains running over sheaves mounted at top of car.
2. Provide a flush car light fixture in car ceiling. Light shall be connected to illuminate automatically when car arrives at landing and doors is opened and shall be automatically extinguished when doors is closed.
3. Provide metal nameplate in car showing name of manufacturer, and rated load in pounds, stamped, etched or raised letters.

B. A service demand bell with a 75 mm (3 in.) diameter gong shall be provided on the cart lift car. Bell shall be arranged to sound when a

pushbutton is pressed while the car is standing at a floor with the doors open.

PART 3 – EXECUTION

3.1 PREPARATION

A. Examine work of other trades on which the work of this Specification depends. Report defects to the Resident Engineer in writing that may affect the work of cart lift contractor.

B. Examine car lift hoistway openings for plumb, level, in line, and pit is proper size, waterproofed, drained with necessary access door, and ladder.

C. Examine machine room for proper illumination, heating, ventilation, electrical equipment, and beams are correctly located complete with access stairs and door.

D. If the Car lift Contractor requires changes in size or location of trolley beams or their supports and trap doors, etc., to accomplish their work, he must make arrangements, subject to approval of the Contracting officer, and include additional cost in their bid.

E. Work required prior to the completion of the cart lift installation:
   1. Supply of electric feeder wires to the terminals of the cart lift control panel, including circuit breaker.
   2. Provide light and GFCI outlets in the cart lift pit and machine room.
   3. Furnish electric power for testing and adjusting cart lift equipment.
   4. Furnish circuit breaker for car and hoistway lights and receptacles.
   5. Supply power for cab lighting.
   6. Machine room enclosed and protected from moisture, with self-closing, self-locking door and access stairs.
   7. Provide fire extinguisher in/near machine room.

F. Provide to General Contractor for installation; inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.

3.2 ARRANGEMENT OF EQUIPMENT

A. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or

removing other equipment in the same machine room. Locate controller near and visible to its respective hoisting machine.

3.3 INSTALLATION, WORKMANSHIP, AND PROTECTION

A. Installations shall be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation shall be mechanically and electrically correct. Materials and equipment shall be new and without imperfections.

B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Contractor's work. All new holes in concrete shall be core drilled.

C. Structural members shall not be cut or altered. Work in place that is damaged or defaced shall be restored equal to original new condition.

D. Finished work shall be straight, plumb, level, and square with smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. At final completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.

E. Sleeves for conduit and other small holes shall project 50 mm (2 in.) above concrete slabs.

F. Hoist cables that are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal or expanded metal guards.

G. Exposed gears, sprockets, and sheaves shall be guarded from accidental contact.

3.4 CLEANING

A. Upon completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster, dust, and other debris.

B. Clean machine room and equipment.

C. Perform hoistway clean down.

D. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish surfaces with regard to type of material.

3.5 PAINTING AND FINISHING

A. Hoist machine, motor, shall be factory painted with manufacturer's standard finish and color.

B. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers except their machined surfaces, cams, brackets and all other uncoated ferrous metal items shall be painted one factory primer coat or approved equal.

C. All equipment, except specified as architectural finish, shall be painted one coat of approved color, conforming to manufacturer's standard.

D. Car lift hoisting machine, controller, governor, main line circuit breaker, safety plank, and cross head of car shall be identified by 100 mm (4 in.) high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled or decaled.

E. Hoistway entrances of cart lift:

1. Door panels shall be stainless steel with a brushed finish.
2. Fascia plates, toe guards, dust covers, hanger covers and other metal work, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) shall be given an approved prime coat in the shop, and one field coat of paint of approved color.

3.6 PRE-TESTS AND TESTS

A. Pre-test the cart lift and related equipment in the presence of the Resident Engineer or his authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by Resident Engineer.

1. Contracting Officer shall obtain the services of a third party QEI Certified Elevator Inspector. The QEI must utilize an Elevator Acceptance Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1, ASME A17.2, and contract documents. Upon completion of inspection and testing, the QEI must sign a copy of the completed form and provide to the Contracting Officer. Within 2 weeks of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the QEI will complete, sign, and provide a certificate of compliance with ASME A17.1.

2. Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked test weights, voltmeter, amp-meter and amp probe, thermometers, direct reading tachometer, and a means of two-way communication.

B. Inspection of workmanship, equipment furnished, and installation for compliance with specifications.

C. Balance Tests: The percent of counterbalance shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counter balance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.

D. Full-Load Run Test: Cart lift shall be tested for a period of one-hour continuous run with full contract load in the car. The test run shall consist of the cart lift stopping at all floors, in either direction of travel, for not less than five or more than ten seconds per floor.

E. Speed Test: The actual speed of the cart lift shall be determined in both directions of travel with full contract load, balanced load, and no load in the cart lift. The actual measured speed of the cart lift with all loads in either direction shall be within three (3) percent of specified rated speed. Full speed runs shall be quiet and free from vibration and sway.

F. Temperature Rise Test: The temperature rise of the hoisting motor shall be determined during the full load test run. Temperatures shall be measured by the use of thermometers. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees Centigrade above ambient temperature. Test shall start when all machine room equipment is within five (5) degrees Centigrade of the ambient temperature. Other tests for heat runs on motors shall be performed as prescribed by the Institute of Electrical and Electronic Engineers.

G. Car Leveling Test: Cart lift leveling devices shall be tested for accuracy of leveling at all floors with no load in car in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (.125 in.) of level with any landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall

maintain the car floor within plus or minus 3 mm (.125 in.) of level with the landing floor regardless of change in load.

H. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator.

I. Insulation Resistance Test: The cart lift's complete wiring system shall be free from short circuits and grounds and the insulation resistance of the system shall be determined by use of megohm meter, at the discretion of the Inspector conducting the test.

J. Safety Devices: Car and counterweight safety devices shall be tested.

K. Overload Devices: Test all overload current protection devices in the system at final inspection.

L. Limit Stops:

1. The position of the car when stopped by each of the normal limit stops with no load and with contract load in the car shall be accurately measured.
2. Final position of the cart lift relative to the terminal landings shall be determined when the cart lift has been stopped by the final limits. The lower limit stop shall be made with contract load in the cart lift. Cart lift shall be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

M. Operating and Signal System: The cart lift shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.

N. If equipment fails test requirements and a re-inspection is required, the Contractor shall be responsible for the cost of re-inspection; salaries, transportation expenses, and per-diem expenses incurred by the elevator inspector and representative of the Resident Engineer.

3.7 INSTRUCTION OF VA PERSONNEL

A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one eight-hour day. Instruction shall commence after completion of all work and at the time and place directed by the Contracting Officer.

B. Written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories shall be furnished and delivered to the Resident Engineer in independently bound folders. DVD recordings will also be acceptable. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list with descriptive literature, and identification and diagrams of equipment and parts. Information shall also include electrical operation characteristics of all circuits, relays, timers, electronic devices, and related characteristics for all rotating equipment.

C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

3.8 INSPECTION AND MAINTENANCE SERVICE: GUARANTEE PERIOD OF SERVICE

A. Furnish complete preventive inspection, interim and warranty maintenance service on entire cart lift installation for a period of one (1) year after completion and acceptance of all the car lifts in this specification by the Resident Engineer. This maintenance service shall begin concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.

1. Upon completion of the engineering phase and submittal process and not less than 30 days prior to mobilization of the project, Contractor to provide interim maintenance for all vertical transportation units being modernized or replaced. These units are as follows P1-P4 Gearless Traction Elevators, S1-S4 Gearless Traction Elevators and T-4 Geared Traction Cart-lift.
2. Monthly systematic examination of equipment is required per 3.8.
3. Interim maintenance to be the responsibility of the Contractor until final acceptance of all vertical transportation units. Upon Final Acceptance, Contractor to be responsible for Warranty Maintenance for 12 months.

B. This contract will cover full maintenance including emergency call back service, inspections, and servicing the cart lift listed in the schedule of elevators. The Elevator Contractor shall perform the following:

1. Monthly systematic examination of equipment.
2. During each maintenance visit the Elevator Contractor shall clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in first class condition and proper working order.
3. Furnishing all lubricant, cleaning materials, parts and tools necessary to perform the work required. Lubricants shall be only those products recommended by the manufacturer of the equipment.
4. Equalizing tension, shorten or renew hoisting ropes where necessary to maintain the safety factor.
5. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates, signal system, car safety device, tension and sheaves in pit shall be cleaned, lubricated and adjusted.
6. Guide rails, overhead sheaves and beams, counterweight frames, and bottom of platforms shall be cleaned every three months. Car tops and machine room floors shall be cleaned monthly. Accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Cleaning supplies and vacuum cleaner shall be furnished by the Contractor.
7. Maintain the performance standards set forth in this specification.
8. The operational system shall be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
9. Maintain smooth starting and stopping and accurate leveling at all times.

C. Maintenance service shall not include the performance of work required as a result of improper use, accidents, and negligence for which the Cart lift Contractor is not directly responsible.

D. Provide 24-hour emergency call-back service that shall consist of promptly responding to calls within two hours for emergency service should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons using the cart lift.

E. Service and emergency personnel shall report to the Resident Engineer or his authorized representative upon arrival at the hospital and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the Resident Engineer.

F. The Cart lift Contractor shall maintain a log in the machine room. The log shall list the date and time of all monthly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed, or parts replaced.

G. Written "Maintenance Control Program" shall be in place to maintain the equipment in compliance with ASME A17.1 Section 8.6.

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SECTION 14 21 10
MODERNIZATION OF TRACTION ELEVATORS
NRM PROJECT 501-19-101
BUILDING #41 ELEVATOR #P1-P4
BUILDING #41 ELEVATOR #S1-S4

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies the engineering, furnishing and modernization of the complete traction elevator system as described herein and as indicated on the Contract drawings.

B. Items listed in the singular apply to each elevator in this specification except where noted.

C. Passenger Elevator P1-P4 shall be overhead gearless traction, microprocessor control system, power operated car and hoistway doors. Elevator shall be Class "A" loading rated.

D. Service/Passenger Elevator S1-S4 shall be overhead gearless traction, microprocessor control system, power operated car and hoistway doors. Elevator shall be Class "C3" loading rated.

ELEVATOR SCHEDULE		
Elevator Number	P1-P4	S1-S4
Overall Platform Size	8′ 0″ W X 6′ 2″ D	6′ 8″ W X 8′ 8″ D
Clear Inside Platform	7′ 8″ W X 5′ 6″ D	6′ 4″ W X 7′ 6″ D
Rated Load – kg (lb.)	4000	5000
Contract Speed – m/s (fpm)	500 FPM	500 FPM
Total Travel – m (ft)	82′ FIELD VERIFY	82′ FIELD VERIFY
Floors Served	B, 1-6	B, 1-6
Number of Openings	7	7
Entrance Type & Size	CENTER OPENING 4′ 0″ W X 7′ 0″ H	CENTER OPENING 4′ 0″ W X 7′ 0″ H
Type of Roping	2 TO 1	2 TO 1

1.2 RELATED WORK

A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.

C. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.

E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
F. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
H. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
I. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.
J. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.
K. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
L. Section 26 43 13, TRANSIENT-VOLTAGE SURGE SUPPRESSION: Surge suppressors installed in panelboards.
M. Section 26 51 00, INTERIOR LIGHTING: Fixture and ballast type for interior lighting.

1.3 QUALIFICATIONS

A. Approval by the Contracting Officer is required for products and services of proposed manufacturers, suppliers, installers, and shall be contingent upon submission of certificates by the Contractor stating the following:
   1. Elevator contractor is currently and regularly engaged in the installation of elevator equipment as one of his principal products.
   2. Elevator contractor shall have five (5) years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
   3. Elevator Mechanic (Installer) shall have passed a Mechanic Examination approved by the U.S. Department of Labor and have technical qualifications of at least five years of experience in the elevator industry or 10,000 hours of field experience working in the elevator industry with technical update training. Apprentices shall be actively pursuing Certified Elevator Mechanic status. Certification shall be submitted for all workers employed in this capacity.

B. Welding at the project site shall be performed by certified welders who have previously qualified by test as prescribed in American Welding Society Publications AWS Dl.1 to perform the type of work required. Certificates shall be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and shall be obtained from the VAMC safety department. Request permit one day in advance.

C. Electrical work shall be performed by a Licensed Master Electrician and Licensed Journeymen Electricians as requirements by NEC. Certificates shall be submitted for all workers employed in this capacity.

D. Approval will not be given to elevator contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record of unsatisfactory elevator installations, have failed to complete awarded contracts within the contract period, and do not have the requisite record of satisfactorily performing elevator installations of similar type and magnitude.

E. Approval of Elevator Contractor’s equipment will be contingent upon their providing factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA’s designated Elevator Maintenance Service Provider. Identifying an elevator maintenance service provider that shall render services within one hour of receipt of notification, together with certification that the quantity and quality of replacement parts stock is enough to warranty continued operation of the elevator installation.

F. Equipment within a group of traction elevators shall be the product of the same manufacturer.

G. The Contractor shall provide and install safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification. Elevator installation shall meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.

B. Federal Specifications (Fed. Spec.):

J-C-30B - Cable and Wire, Electrical (Power, Fixed Installation)

J-C-580 – Cord, Flexible, and Wire, Fixture

W-S-610 – Splice Connectors

W-C-596F - Connector, Plug, Electrical; Connector, Receptacle, Electrical

W-F-406E - Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible

HH-I-558C - Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)

W-F-408E - Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-wall Type)

RR-W-410 - Wire Rope and Strand

TT-E-489J - Enamel, Alkyd, Gloss, Low VOC Content

QQ-S-766 - Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip

C. American Society of Mechanical Engineers (ASME):

A17.1 - Safety Code for Elevators and Escalators

A17.2 - Inspectors Manual for Electric Elevators and Escalators

D. National Fire Protection Association:

NFPA 13 - Standard for the Installation of Sprinkler Systems

NFPA 70 - National Electrical Code (NEC)

NFPA 72 -National Fire Alarm and Signaling Code

NFPA 101 - Life Safety Code

NFPA 252 - Fire Test of Door Assemblies

E. International Building Code (IBC)

F. American Society for Testing and Materials (ASTM):

A1008/A1008M-09 - Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability

E1042-02 - Acoustically Absorptive Materials Applied by Trowel or Spray

G. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):

SP-58 - Pipe Hangers and Supports

H. Society of Automotive Engineers, Inc. (SAE):

J517-91 - Hydraulic Hose, Standard Gauges:

I. Sheet and Plate: U.S. Standard (USS)

J. Wire: American Wire Gauge (AWG)

K. American Welding Society (AWS):

D1.1 - Structured Welding Code Steel

L. National Electrical Manufacturers Association (NEMA):

LD-3 - High-Pressure Decorative Laminates

M. Underwriter's Laboratories (UL):

486A - Safety Wire Connectors for Copper Conductors

797 - Safety Electrical Metallic Tubing

N. Institute of Electrical and Electronic Engineers (IEEE)

O. Regulatory Standards:

VA Barrier Free Design Handbook H-18-13

VA Seismic Design Manual H-18-8

1.5 SUBMITTALS

A. Submit in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related elevator material shall be forwarded to the Contracting Officer.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each elevator unit specified including:
   a. Hoisting machines, controllers, power conversion devices, governors, and all other components located in machine room.
   b. Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, and size of car platform, car frame members, and other components located in hoistway.
   c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with H 18-8 for Seismic Risk Zone 2 or greater.
   d. Reaction at points of support and buffer impact loads.
   e. Weight of principal parts.
   f. Top and bottom clearances and over travel of car and counterweight.

g. Location of main line switch/shunt trip circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.

2. Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.
   a. If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.
   b. Sill details including sill support.

D. Samples:
1. One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).
2. One each of baked enamel, 75 mm x 125 mm (3 in. x 5 in.).
3. One each of color floor covering.
4. One each of protection pads, 75 mm x 125 mm (3 in. x 5 in.) if used.
5. One each car and hoistway Braille plate sample.
6. One each car and hall button sample.
7. One each car and hall lantern/position indicator sample.
8. One each wall and ceiling material finish sample.
9. One each car lighting sample.

E. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the elevator layouts:
1. Hoisting Machine.
2. Hoisting Machine Motor, HP and RPM ratings, Voltage, Starting and Full Load Ampere, and Number of Phases.
3. Controller.
4. Starters and Overload Current Protection Devices.
5. Car Safety Device; Type “B” safeties and Governor.
6. Electric Door Operator; HP, RPM, Voltage, and Ampere rating of motor.
7. Hoistway Door Interlocks.
8. Car and Counterweight Buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.
9. Cab Ventilation Unit; HP rating and CFM rating.
10. Hoist and Compensation Ropes; breaking strength, allowable working load, and actual working load.

F. Complete construction drawings of elevator car enclosure showing dimensioned details, fastenings to platform, car lighting, ventilation, ceiling framing, top exits, and location of car equipment.

G. Complete dimensioned detail of vibration isolating foundations for traction hoisting machines.

H. Dimensioned drawings showing details of:

1. All signal and operating fixtures.
2. Car and counterweight roller guides.
3. Hoistway door tracks, hangers, and sills.
4. Door operator, infrared curtain units.

I. Cut sheets and drawings showing details of controllers and supervisory panels.

J. Furnish certificates as required under: Paragraph "QUALIFICATIONS".

1.6 WIRING DIAGRAMS

A. Provide three complete sets of paper and one electronic set field wiring and straight-line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the elevator machine room as directed by the COR.

B. In the event field modifications are necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the COR within thirty (30) days of final acceptance.

C. Provide the following information relating to the specific type of microprocessor controls installed:

1. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
2. System logic description.
3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

1.7 WORK SCHEDULE

A. Before starting work submit a detailed work schedule for approval and arrange with COR sequence of procedure, means of access to premises, space for storage, use of approaches, corridors, stairways, elevators, location of temporary partitions, disposal of trash and recyclable materials. The COR must be notified twenty (20) calendar days, in writing, in advance of starting work on elevators. No work may begin on any elevator until all materials for that elevator have been delivered to the site and verified by the Contracting Officer and/or Contracting Officer's Representative. The phasing of work on the elevators shall be coordinated with the Contracting Officer and/or the Contracting Officer's Representative.

B. Temporary shutdowns, including elevator dispatching, group operations, and controls cutovers, which involve the disabling of hall buttons, testing operation or dispatching will be required to be scheduled during weekend and off hours, with a 30-day advance notice provided to the VA.

1.8 SAFETY PRECAUTIONS

A. Building 41 will be occupied during execution of work. Work shall be conducted in a manner to afford maximum protection of patients, public, employees, building and facilities to prevent unreasonable delay or interference with normal functioning of hospital activities.

B. Where an adjacent elevator is in operation, isolate the elevators from each other with suitable temporary barriers between them, extending from the pit floor to bottom of the slab at top of hoistway, while work is in progress. Remove partition when work is completed.

C. Provide fire extinguishers that are always readily available.

D. It shall be the obligation of the contractor to maintain a free and clear passageway in each elevator lobby. Parts and tools shall be kept within the confines of entrance partitions. Trash and debris shall be removed daily.

E. Provide fire rated partition during the modernization of elevators. Barrier shall extend to the full height of the elevator entrance and shall be dust and vapor proof with dust absorbing mats at access points. Coordinate with architectural drawings.

1.9 REMOVAL OF MATERIALS AND EQUIPMENT

A. Material and equipment that are not specified to be reused or retained under contract shall be removed daily from the site at the expense of the contractor. The contractor shall receive title to all material and equipment not specified to be reused as of date of withdrawal from service. The government does not warranty condition of the material to which contractor shall obtain title, nor shall the government be liable for damage before or after title passes to contractor.

1.10 PERFORMANCE STANDARDS

A. The elevators shall meet the highest standards of the industry and specifically the following:
   1. Contract speed is high speed in either direction of travel with rated capacity load in the elevator. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
   2. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per ft/s/s and the maximum acceleration and retardation shall not exceed 0.2G per ft/s/s.
   3. Starting, stopping, and leveling shall be smooth and comfortable without appreciable steps of acceleration and deceleration.

B. Passenger/Service door operator shall open the car door and hoistway door at 2.5-feet per second and close at 1-foot per second. Freight door operators shall open and close at 1-foot per second.

C. Floor level stopping accuracy shall be within 3 mm (.125 in.) above or below the floor, regardless of load condition.

D. Noise and Vibration Isolation: All elevator equipment including their supports and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

E. Sound Isolation: Noise level relating to elevator equipment operation in machine room shall not exceed 80 db. All db readings shall be taken three (3) feet off the floor and three (3) feet from equipment.

F. Airborne Noise: Measured noise level of elevator equipment during operation shall not exceed 50 db in elevator lobbies and 60 db inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.

1.11 WARRANTY

A. Submit all labor and materials furnished regarding elevator system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The one-year Warranty shall commence after final inspection, completion of performance test, and upon full acceptance of the installation and run concurrent with the guarantee period of service.

B. During warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, device shall be removed and a new device meeting all requirements shall be installed as part of work until satisfactory operation of installation is obtained. Period of warranty shall start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

1.12 POWER SUPPLY

A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.

B. Main Line Fused Disconnect Switch/Shunt Trip Circuit Breaker for each controller shall be located inside the machine room at the strike side of the machine room door and lockable in the “Off” position.

C. Provide Surge Suppressors to protect the elevator equipment.

1.13 EMERGENCY POWER SUPPLY

A. Emergency power supply, its starting means, transfer switch for transfer of elevator supply from normal to emergency power, two pair of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Elevator Controller Manufacturer) to terminals in the group elevator controller and other related work shall be provided by the Electrical Contractor.

B. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device.

C. Prior to the return of normal power an adjustable timed circuit shall be activated that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual

transfer of power from emergency power to normal building power shall take place after all cars are stopped at a floor with their doors open.

D. Car lighting circuits shall be connected to the emergency power panel.

1.14 ELEVATOR MACHINE ROOM AND MACHINE SPACE

A. Reuse existing machine room and meet the requirements of ASME A17.1, NFPA 70, NFPA 101 and IBC.

B. Locate the shunt trip breaker/main line disconnect and machine room light switch at the lock side of the door inside the machine room.

C. Locate sprinkler pipes, if required, to provide seven 201 cm (7 ft) head clearance. Do not locate sprinkler heads, heat detectors, and smoke detectors directly over elevator equipment.

1.15 HOISTWAY LIGHTING

A. Provide LED lighting with 3-way switches at the top and bottom of the hoistway accessible from elevator hoistway entrance prior to entering the pit or stepping onto the car top.

B. LED Lighting shall illuminate top of elevator cab when it is at the top floor and the pit when at the bottom floor.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and surfaces shall be smooth and without waves. During installation stainless steel surfaces shall be protected with suitable material.

B. Where cold rolled steel is specified, it shall be low-carbon steel rolled to stretcher level standard flatness, complying with ASTM A109.

2.2 MANUFACTURED PRODUCTS

A. Materials, devices, and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. The elevator equipment, including controllers, door operators, and supervisory system shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.

B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit. Components shall be compatible with each other and with the total assembly for the intended service.

C. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.

D. If key operated switches are furnished in conjunction with component of this elevator installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each key shall have a tag bearing a stamped or etched legend identifying its purpose.

E. Basis of design is as follows for key components. Elevator Contractor to provide submittals for consideration of any replacement components for VA review.

Component	Manufacturer	Model
Gearless Machine	Imperial	570-OB
Controllers	MCE	I-Box
Door Equipment	GAL	MOVFE Linear
Fixtures	Innovation	Bruiser Series

2.3 CONDUIT AND WIREWAY

A. Reuse existing when possible and provide new conduit and wireway where needed. Install electrical conductors, except traveling cable connected to the elevator, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than .75 inch or electrical metallic tubing smaller than .50-inch electrical trade size shall not be used. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the elevator machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than .375-inch electrical trade size may be used, not exceeding 18 inches in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

B. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.

C. Rigid conduit and EMT fittings using set screws or indentations as a means of attachment shall not be used.

D. Connect motor or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

2.4 CONDUCTORS

A. Remove existing and provide new conductors, excluding the traveling cables. Conductors shall be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets. Tap connectors may be used in wireways provided they meet all UL requirements.

B. Provide all conduit and wiring between machine room, hoistway and fixtures.

C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.

D. Where size of conductor is not given, voltage and amperes shall not exceed limits set by NEC.

E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.

F. Terminal connections for all conductors used for external wiring between various items of elevator equipment shall be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Elevator Contractor may, at his option, make these terminal connections on #10 gauge or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

2.5 TRAVELING CABLES

A. Remove existing and provide new flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks shall have permanent indelible identifying numbers for each connection. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.

C. Provide shielded wires for the auto dial telephone system within the traveling cable, five (5) pair shielded wires for card reader, one (1) RG-6 Ethernet cable for Wi-Fi, two (2) pair 14-gauge wires for 110 Volt power supply, and wire for video display monitor if specified.

D. If traveling cables contact the hoistway or elevator due to sway or change in position, provide shields or pads to the elevator and hoistway to prevent damage to the traveling cables.

E. Hardware cloth may be installed from the hoistway suspension point to the elevator pit to prevent traveling cables from rubbing or chafing and securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

2.6 CONTROLLER AND SUPERVISORY PANEL

A. Remove existing and provide new UL/CSA Labeled Controller. Mount all assemblies, power supplies, chassis switches, and relays on a steel

frame in a NEMA Type 1 General Purpose Enclosure. Cabinet shall be securely attached to the building structure.

B. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controller and supervisory panel shall be neatly formed, laced, and identified.

2.7 MICROPROCESSOR CONTROL SYSTEM

A. Provide a new microprocessor control system with absolute position/speed feedback to control dispatching, signal functions, door operation, and VVVF Drive for hoist motor control. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval. Provide fully Regenerative Drives.

B. Controller manufacturer shall provide factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA’s designated Elevator Maintenance Service Provider.

2.8 MACHINE ROOM MONITOR

A. Provide an LCD monitor in each machine room, separate monitors for each passenger elevator group, and each service elevator group. Provide a separate keyboard for each monitor.

B. The monitor shall contain indicators to provide the following information:

1. The floor where each elevator is currently located.
2. The direction that each elevator is currently traveling or is scheduled to travel.
3. The location and direction of currently registered hall calls.
4. Elevators that are currently out of service.
5. Elevators that are currently bypassing hall calls.
6. Elevators that are currently engaged in passenger transfers.
7. Operations program under which entire group is currently operating.
8. Zone divisions of the entire group.
9. Door positions.

10. Status indication for elevators on independent service, car top inspection, fire service, earthquake protection, and activated stop switch and alarm bell.

C. The maintenance terminal shall be suitable for all troubleshooting procedures related to the specific type of microprocessor installed on this project.

2.9 EMERGENCY POWER OPERATION

A. The control system for Elevator(s) shall provide for the operation of at least one car per elevator group on emergency power upon failure of the normal power supply.

B. Auxiliary equipment on elevator controllers, wiring between associated elevator controllers and wiring between elevator controllers and remote selector panel as required to permit the elevators to operate as detailed, shall be provided by the Elevator Contractor.

C. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device. After adjusting delay, the associated elevators shall function as follows:

1. Selector switch, Automatic position:
   a. Not more than one elevator at a time in each group shall be automatically selected and returned to the main floor, at contract speed, cycle its car and hoistway doors and shut down, with "Door Open" button remaining operable.
   b. As each elevator reaches the designated floor and shuts down, another elevator shall start and return to the designated floor.
   c. Elevators that have been manually removed from automatic service and are on independent service, fire service or medical emergency shall receive an automatic return signal. Elevators on inspection service or out of service shall not receive a signal.
   d. When an elevator is given a signal to return, and it is unable to start its movement to the designated floor within 30 seconds it shall be by-passed. When an elevator is by-passed, another elevator shall start and return.
   e. This process shall continue until all elevators have returned to the designated floor and shut down.

f. Any elevator or elevators by-passed on initial return signal shall be signaled again.

g. When all cars in group have returned to designated floor, one-two elevators in each group shall be designated for automatic operation. Individual cars in each group shall restart at 5 second intervals.

h. If elevator(s) are keyed on to medical emergency service in the car prior to transfer to emergency power operation, medical emergency service shall be retained. This elevator shall be the first automatically selected elevator to operate on emergency power operation and complete its selected call demand. The elevator will return to the designated floor after the key switch is reset to normal position.

2. Selector switch, Manual operation:

a. Selector switch shall be mechanically and electrically interlocked to prevent the selection of more than one elevator from operating on emergency power.

b. The selector switch shall have positions marked with the number of each elevator controlled. It shall also have a position marked "Automatic". When the selector switch is set to the automatic position, the medical emergency service car shall operate on emergency power operation, or if none, the last car arriving at the designated floor shall operate on emergency power operation.

c. Change in selection of elevators shall be by means of the selection switch and shall occur only when the previous selected elevator is stopped at the designated floor.

d. The selector switch shall be locked out of operation when the system is in the normal mode of operation.

e. Locate the selector switch above the hall push button at the designated level. The key switch shall be a tumbler type lock furnished with four keys. The enclosure faceplate shall be identified "Emergency Power Control" with 13 mm (.50 in.) engraved letters filled with black paint.

D. Prior to the return of normal power an adjustable timer circuit shall activate that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual transfer of

power from emergency power to normal building power shall take place after all cars are stopped at a floor with their doors open.

2.10 FIREFIGHTER'S SERVICE

A. Provide Firefighter's Service.

1. Main Floor: 1
2. Alt. Floor: B
3. Verify main and alternate floors with COR.

2.11 INDEPENDENT SERVICE

A. Provide an INDEPENDENT SERVICE toggle switch in the service operating panel that shall have its positions marked "ON" and "OFF". When the switch is in the "ON" position, the car shall respond only to calls registered on its car dispatch buttons and shall bypass all calls registered on landing push buttons. The car shall start when a car call is registered, car call button or door close button is pressed, car and hoistway doors are closed, and interlock circuits are made. When switch is returned to "OFF" position, normal service shall be resumed.

2.12 MEDICAL EMERGENCY SERVICE – PATIENT CARE FACILITIES S1-S4 ONLY

A. Provisions shall be made for calling elevator(s) to floors served by the elevator on an emergency basis, operating independently from the dispatch signals and landing call signals.

B. Install card reader in the floor landing push button fixture above the push buttons.

C. Provide a call registered light indicator adjacent to card reader. The card reader/key switch at the landings and in the car, shall only be operable by authorized personnel with a valid VA ID badge/key.

D. When card reader is activated at any floor, the call register light indicator shall illuminate at the call floor and inside the elevator only. The elevator control system shall instantly select an elevator to respond to the medical emergency call. Immediately upon selection, all car calls shall be cancelled. If car is traveling away from the medical emergency call, it shall slow down and stop at the nearest floor, maintain closed doors, reverse direction and proceed nonstop to the medical emergency call floor. If the car is traveling toward the medical emergency call floor, it shall proceed to that floor nonstop. If at the time of selection, it is slowing down for a stop, the car shall stop, maintain doors closed, and start immediately toward the medical emergency floor.

E. Arriving at the medical emergency floor, the car shall remain with doors open for 30 seconds. After this interval has expired and the car has not been placed on medical emergency operation inside the car, the car shall automatically return to normal service.

F. Provide an LED illuminated indicator light next to the Medical Emergency card reader the same size as the Fire Service indicator.
   1. Locate a “Medical Emergency” card reader above call buttons in the main car operating panel for selecting medical emergency service. Activation of the card reader will allow the car to accept a car call for any floor, close doors, and proceed nonstop to the floor desired.
   2. After medical emergency call has been completed the elevator shall return to normal operation after an adjustable time of 30 to 90 seconds has expired.

G. In the center of the rear cab panel provide a back lighted "MEDICAL EMERGENCY" LED illuminated display that shall flash on and off continuously when the car is assigned to this operation and until it is restored to normal service. "MEDICAL EMERGENCY" indicator shall be a photographic negative type 1830 mm (72 in.) to center above the floor, 152 mm (6 in.) wide X 76 mm (3 in.) high, with 12 mm (.50 in.) high letters legible only when illuminated.

H. If the car being operated on “Independent Service”, the medical emergency service indicator lights in the car operating panel and rear wall shall be illuminated, buzzer shall sound, and the “Audio Voice” system shall direct the attendant to return the car to automatic operation.

I. If the car is out of service and unable to answer medical emergency calls, the call register light shall not illuminate.

J. Each card reader shall have its identity legible and indelible engraved in faceplates. All lettering shall be 6 mm (.25 in.) high, filled with black paint.

K. When Phase I firefighter’s recall is activated it shall over-ride elevators on medical emergency service and return them to the main or alternate fire service recall floor. When the fire emergency floor has been identified the attendants may complete their medical emergency run on Phase II firefighter’s operation if life safety is not affected.

2.13 LOAD WEIGHING

A. Provide means for weighing car load for each elevator. When load in a car reaches an adjustable predetermined level of the rated capacity, that car shall bypass registered landing calls until the load in the car drops below the predetermined level. Calls bypassed in this manner shall remain registered for the next car. The initial adjustment of the load weighting bypass setting shall be 60 percent.

2.14 ANTI-NUISANCE FEATURE

A. If weight in the car is not commensurate with the number of registered car calls, cancel car calls. Systems that employ either load weighing or door protective device for activation of this feature are acceptable.

2.15 SEISMIC REQUIREMENTS

A. Meet the requirements of VA Seismic Design Manual H-18-8.

2.16 ELEVATOR MACHINE BEAMS

A. Reuse existing beams and add blocking beams as required by machine manufacturer.

2.17 TRACTION HOIST MACHINE

A. Provide new gearless traction machines with an AC motor, brake, drive sheave, and deflector sheave mounted in proper alignment on an isolated bedplate.

B. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.

C. Drive sheaves shall be free from cracks, sand holes, and other imperfections that would tend to damage the hoist ropes. Sheave shall be turned smooth and true with rope grooves of proper design to insure maximum traction and maximum life of the hoist ropes.

D. Hoisting machine brake shall be drum or disc type and shall stop and hold the elevator with 125 percent of rated load.

2.18 DEFLECTOR SHEAVES

A. Provide new deflector sheaves with a metal guard and a guard to prevent ropes from jumping out of grooves. Securely fasten guard to sheave support beams. Install deflector sheave in machine room frame assembly.

2.19 HOIST ROPES

A. Provide elevator with the required number and size of new ropes to insure adequate traction and required safety factor. Hoisting ropes shall be pre-formed 8 x 19 or 8 x 25 traction steel, conforming to

Federal Specification RR-W-410 with minimum nominal diameter of 0.50 inch.

B. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on top of the elevator.

2.20 HOIST ROPE COMPENSATION

A. Retain existing compensation assembly and refurbish.
   1. Provide new compensation ropes.
   2. Replace bearings on compensation sheave assembly.
   3. Provide new compensation limit switch assembly.

2.21 GOVERNOR ROPE

A. New governor rope shall be 6 x 19 or 8 x 19 wire rope, preformed traction steel, uncoated, fiber core, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.375 inch having a minimum safety factor of 5. Tiller rope construction is not acceptable.

B. Under normal operation rope shall run free and clear of governor jaws, rope guards, and other stationary parts.

C. Securely attach governor rope tag to governor rope releasing carrier.

2.22 SPEED GOVERNOR

A. Provide new centrifugal car driven governor to operate the car safety device. Governor shall be complete with weighted pit tension sheave, governor release carrier and mounting base with protected cable sleeves.

B. Provide overspeed switch, and a speed reducing switches when required.

C. The governor rope clamping device shall be designed to prevent appreciable damage to or deformation of the governor rope that results from the stopping action of the device operating the safety.

D. Provide metal guard over top of governor rope and sheaves.

E. Provide self-resetting governor and integrate into controller operation.

2.23 CAR SAFETY DEVICE

A. Reuse existing car safety devices. Clean, adjust, lubricate, and test. Replace worn, damaged, or missing parts as needed.

2.24 ASCENDING CAR OVERSPEED PROTECTION

A. Provide new devices to prevent ascending over speed and unintended motion away from the landing when the doors are not closed and locked.

2.25 CAR AND COUNTERWEIGHT BUFFERS

A. Reuse existing, clean, refill with new oil, verify proper tags, and paint as needed.

2.26 COUNTERWEIGHTS

A. The counterweight shall be cleaned and all missing or damaged bolts, tie rods, and frames members shall be replaced.

B. Sub-weights shall be added or removed from the counterweights frame to provide counter balance equal to the weight of the complete car and 40 to 50 percent of the rated capacity, as required by the controller manufacturer. New sub-weights shall be cast iron, flame cut hot rolled steel, or cast lead.

C. Reuse existing counterweight guard. If compensation chains are required remove counterweight guards.

2.27 GUIDE RAILS, SUPPORTS, AND FASTENINGS

A. Retain existing car and counterweight guide rails and brackets.

B. Thoroughly clean all guide rails of dust, grease, oil, rust, and other foreign substances. File and remove all rough edges and surfaces and tighten bracket bolts and guide clips for smooth and quiet operation of car and counterweight.

2.28 NORMAL AND FINAL TERMINAL STOPPING DEVICES

A. Mount new terminal slowdown switches and direction limit switches on the elevator or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.

1. Switches shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.
2. Switches, when opened, shall permit operation of elevator in reverse direction of travel.

B. Mount new final terminal stopping switches in the hoistway.

1. Switches shall be positively opened should the car travel beyond the terminal direction limit switches.
2. Switches shall be independent of other stopping devices.
3. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake, and prevent operation of car in either direction.

2.29 CROSSHEAD DATA PLATE AND CODE DATA PLATE

A. Permanently attach a non-corrosive metal Data Plate to car crosshead.

B. Permanently attach a non-corrosive Code Data Plate to the controller.

2.30 WORKMAN'S LIGHTS AND OUTLETS

A. Provide new duplex GFCI protected type receptacles and lamps with guards on top of each elevator car and beneath the platform. The receptacles shall be in accordance with Fed. Spec. W-C-596 for Type D7, 2-pole, 3-wire grounded type, rated for 15 amperes and 125 volts.

2.31 CARTOP OPERATING DEVICE

A. Provide a new cartop operating device.

B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 6 mm (.25 in.) letters.

C. Movement of the elevator shall be accomplished by the continuous pressure on a direction button and a safety button.

D. Provide an emergency stop switch, push to stop/pull to run.

E. Provide permanent identification for the operation of all components in the device.

F. The device shall be permanently attached to the elevator crosshead on the side of the elevator nearest to the hoistway doors used for accessing the top of the car.

2.32 CAR LEVELING DEVICE

A. Car shall be equipped with a new two-way leveling device to automatically bring the car to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction.

B. If the car stops short or travels beyond the floor, the leveling device, within its zone shall automatically correct this condition and maintain the car within 3 mm (.125 in.) of level with the floor landing regardless of the load carried.

2.33 EMERGENCY STOP SWITCHES

A. Provide an emergency stop switch, push to stop/pull to run, for the top-of-car device, pit, machine space, service panel and firefighter’s control panel inside the elevator. Mount stop switches in the pit adjacent to pit access door, at top of the pit ladder 1200 mm (48 in.) above the bottom landing sill and 1200 mm (48 in.) above the pit floor adjacent to the pit ladder.

B. Each stop switch shall be red in color and shall have "STOP" and "RUN" positions legibly and indelibly identified.

2.34 MAIN AND AUXILIARY CAR OPERATING PANEL

A. Provide new main and auxiliary car operating panel in the car enclosure on the front return panels for passenger/service elevators. The top floor car call push button shall not be more than 1200 mm (48 in.) above the finished floor. Car call push buttons and indicator lights shall be LED illuminated, round with a minimum diameter of 25 mm (1 in.). Each button shall contain an integral registration LED white light which shall illuminate upon registration of a call and shall extinguish when that call is answered.

B. One-piece hinged swing return panel shall have the firefighter's service panel recessed into the upper section and the service operation panel recessed into the lower section fitted with hinged doors. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with key operated locks. Secure the faceplate with stainless steel tamperproof screws.

C. All terminology and tactile symbols on the faceplate shall be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. Use 6 mm (.25 in.) letters to identify all devices in the faceplate. The tactile symbols with contrasting background shall be 12.5 mm (0.5 in.) high raised .075 mm (.030 in.) on the plate. Surface mounted plates are not acceptable.

D. The upper section shall contain the following items in order listed from top to bottom:

1. Elevator number, 12.5 mm (.50 in.) high with black paint for contrast.
2. Capacity plate information with black paint for contrast with freight loading class and number of passengers allowed.
3. LED illuminated digital car position indicator with direction arrows.
4. Emergency car lighting system consisting of a rechargeable battery, charger, controls, and LED illuminated light fixture. The system shall automatically provide emergency light in the car upon failure or interruption of the normal car lighting service, and function irrespective of the position of the light control switch in the car. The system shall maintain a minimum illumination of 1.0 foot-candle when measured 1200 mm (48 in.) above the car floor and approximately

300 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.

5. Firefighter's Emergency Operation Panel shall be 1650 mm (66 in.) minimum to 1800 mm (72 in.) maximum to the top of the panel above finished floor.
6. Firefighter's Emergency Indicator Light shall be round with a minimum diameter of 25 mm (1 in.).
7. Medical Emergency card reader/key switch marked "MEDICAL EMERGENCY" with two positions labeled "ON" and "OFF" and Medical Emergency Indicator Light located next to the card reader/key switch shall be round with a minimum diameter of 25 mm (1 in.). Instruction for Medical Emergency operation shall be engraved below the card reader and light.
8. Key operated Independent Service Switch or toggle switch inside service panel.
9. Provide a Door Hold Button on the faceplate next to the Independent Service Key Switch. It shall have "DOOR HOLD" indelibly marked on the button. Button shall light when activated. When activated, the door shall stay open for a maximum of one minute. To override hold timer, push a car call button or door close button.
10. Complete set of round car call push buttons, minimum diameter of 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call buttons shall be legibly and indelibly identified by a floor number and/or letter not less than 12mm (.50 in.) high in the face of the call button.
11. Door Open and Door Close buttons shall be located below the car call buttons. They shall have "OPEN" and "CLOSE" legibly and indelibly identified by letters in the face of the respective button. The Door Open button shall be located closest to the door jamb.
12. Red Emergency Alarm button that shall be located below the car operating buttons. Mount the emergency alarm button not lower than 875 mm (35 in.) above the finished floor. It shall be connected to audible signaling devices. Provide audible signaling devices including the necessary wiring.
13. Emergency Help push button shall activate two-way communications by Auto Dial telephone system that is compatible with the VAMC's telephone system. Help button shall be LED white light illuminated

and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12 mm (.50 in.) high letters.

E. The service operation panel shall be located in the auxiliary panel at the same elevation as the Fire Panel in the main and shall contain the following items:
   1. Light switch labeled "LIGHTS" for controlling interior car lighting with its two positions marked "ON" and "OFF".
   2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch shall be labeled "ACCESS ENABLE" with its two positions marked "ON" and "OFF".
   3. Three position switch labeled "FAN" with its positions marked "HIGH", "LOW" and "OFF" for controlling car ventilating blower.
   4. Two position, spring return, toggle switch or push button to test the emergency light and alarm device. It shall be labeled "TEST EMERGENCY LIGHT AND ALARM".
   5. Two position toggle switch labeled "Independent Service" with its positions marked "ON" and "OFF".

2.35 AUXILIARY CAR OPERATING PANEL (NOT USED)

2.36 CAR POSITION INDICATOR

A. Provide an alpha-numeric digital car position indicator in the main and auxiliary car operating panel, consisting of numerals and arrows not less than 63 mm (2.5 in.) high, to indicate position of car and direction of car travel. Locate position indicator at the top of the main car operating panel, illuminated by light emitting diodes.

2.37 AUDIO VOICE SYSTEM

A. Provide digitized audio voice system. Audio voice shall announce floor designations, direction of travel, and special announcements. The voice announcement system shall be a natural sounding human voice that receives messages and shall comply with ADA requirements for audible car position indicators. The voice announcer shall have two separate volume controls, one for the floor designations and direction of travel, and another for special announcements. The voice announcer shall have a full range loud speaker, located on top of the cab. The audio voice unit shall contain the number of ports necessary to accommodate the number of floors, direction messages, and special

announcements. Install voice announcer per manufacturer's recommendations and instructions. The voice system shall be the product of a manufacturer of established reputation. Provide manufacturer literature and list of voice messages.

1. Fire Service Message.
2. "Please do not block doors".
3. Provide special messages as directed by COR.

2.38 AUTO DIAL TELEPHONE SYSTEM

A. Furnish and install a complete ADA compliant auto dial telephone that is compatible with the VAMC's telephone system.

B. Provide a two-way communication device in the car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with two numbers.

C. "HELP" button shall illuminate and flash when call is acknowledged. Button shall match floor push button design.

D. Provide "HELP" button tactile symbol signage and Braille adjacent to button mounted integral with car operating panels.

E. The auto dial system shall be in the main or auxiliary car operating panel. The speaker and unit shall be mounted on the backside of the perforated stainless-steel plate cover.

F. Each elevator shall have individual phone numbers.

G. If the operator ends the call, the passenger shall be able to redial the telephone immediately.

2.39 CORRIDOR OPERATING DEVICES

A. Provide new elevator operating and signal devices from not less than 3 mm (.125 in.) thick flat stainless steel with all edges beveled 15 degrees.

B. Corridor push button faceplates shall be sized to accommodate corridor pictograph on faceplate. The centerline of the landing push buttons shall be 1050 mm (42 in.) above the corridor floor.

C. Elevator Corridor Call Station Pictograph shall be engraved in the faceplate.

D. Fasten all car and corridor operating device and signal device faceplates with stainless steel tamperproof screws.

E. All terminology and tactile symbols on the faceplate shall be raised .030 inch with contrasting background, on square or rectangular plates

recessed into the faceplate with its surface flush with the surface of the faceplate. The handicapped markings with contrasting background shall be 12.5 mm (0.5 in.) high raised .030 inch on the plate, square or rectangular. Use 6 mm (.25 in.) letters to identify all other devices in the faceplate. Surface mounted plates are not acceptable.

F. Provide two risers of landing call buttons for each elevator or group of elevators as shown on contract drawings.
   1. For Service Elevators S1-S4, provide ability to separate out S2 from the group with an independent riser operation feature.
   2. Integrate with new card reader operation. Provide separate call station for Independent Riser operation.
   3. Provide for key switch and card reader to toggle operation from Group Automatic to Independent Riser operation.
   4. Provide for adjustable timer to swing S2 Elevator out of the group when security reader is activated. Upon S2 completing the designated operation, S2 to go back into group operation withing an adjustable time period of 1-5 minutes. Timer to be field programmable with the elevator controller interface.

G. Each button shall contain an integral registration LED white light which shall illuminate upon registration of a call and shall extinguish when that call is answered.

H. The direction of each button shall be legibly and indelibly identified by arrows not less than 12 mm (.50 in.) high in the face of each button.

I. Landing push buttons shall not re-open the doors while the car and hoistway doors are closing at that floor, the call shall be registered for the next available elevator. Calls registered shall be canceled if closing doors are re-opened by means of "DOOR OPEN" button or infrared curtain unit.

J. Provide a separate fixture above the hall button fixture for emergency power indicator light, fire service recall key switch and indicator light, fire recall instruction, communication failure light, communication audible enunciator, and reset key switch at the designated main floor.

K. Remove old fixtures, repair, and refinish walls.

L. Submit design of hall pushbutton fixtures for approval.

2.40 DIGITAL CORRIDOR ARRIVAL LANTERN/POSITION INDICATOR

A. Provide elevators with new combination corridor lantern/position indicator digital display mounted over the hoistway entrances at each floor. Provide each terminal landing with "UP" or "DOWN", minimum 63 mm (2.5 in.) high digital arrow lanterns and each intermediate landing with "UP" and "DOWN" digital arrow lanterns. Each lens shall be LED illuminated of proper intensity, so shielded to illuminate individual lens only. The lenses in each lantern shall be illuminated green to indicate "UP" travel and red to indicate "DOWN" travel. Lanterns shall signal in advance of car arrival at the landing indicating the direction of travel. Corridor lanterns shall not be illuminated when a car passes a floor without stopping. Each lantern shall be equipped with an audible electronic chime which shall sound once for "UPWARD" bound car and twice for "DOWNWARD" bound car. Audible signal shall not sound when a car passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.

B. Install alpha-numeric digital position indicator between the arrival lanterns. Indicator faceplate shall be stainless steel. Numerals shall be not less than 63 mm (2.5 in.) high with direction arrows. Cover plates shall be readily removable for re-lamping. The appropriate direction arrow shall be illuminated during entire travel of car in corresponding direction.

C. Remove old fixtures, repair, and refinish walls.

2.41 HOISTWAY ACCESS

A. Provide new hoistway access switches for elevator at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Elevators with side slide doors, mount the access key switch 1830 mm (6 ft.) above the corridor floor in the wall next to the strike jamb.

B. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions.

C. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position.

D. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center.

E. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor. Submit design and location of access switches for approval.

F. Provide emergency access for all hoistway entrances, keyways for passenger and service elevators.

2.42 HOISTWAY ENTRANCES: PASSENGER/SERVICE ELEVATORS

A. Refinish existing stainless-steel entrance frames or paint existing painted entrance frames or clad existing entrance frames in stainless steel.

B. Clean and reuse existing hoistway sills, hanger supports, strut angles, fascia plates and toe guards.

C. Replace all damaged or missing dust covers.

D. Provide new stainless steel hoistway doors. Door panels shall be not less than 16-gauge sheet steel and not less than 32 mm (1.25 in.) thick flush type construction with the hall side and leading edge wrapped in one continuous piece of 16-gauge stainless steel. Top and bottom of door panels shall have continuous stiffener channels welded in place. Reinforcement of the door panels shall be approximately 1.0 mm (0.04 in.) in thickness and of the hat section type. Reinforce each door panel for hangers, interlock mechanism, opening and closing devices. Do not use hangers that are constructed integrally with the door panels.

E. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 75 mm (3 in.) in diameter, with non-metallic sound-reducing tires. Equip hangers with adjustable ball-bearing rollers to take upward thrust of panels. Provide two non-metallic door gibs on each door panel and a separate fire gib. Gibs shall be replaceable without removing of door panel. One door panel for each entrance shall bear a BOCA label, Underwriters' label, or other labels may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR. Fasten stainless steel sight guard of 14-gauge metal, extending full height of panel, to leading edge of fast speed panel of two-speed doors.

F. Provide new hardware, tracks, gibs, separate fire gibs, door rollers, door locks, drive roller assemblies and sill mounted closers.

G. Reuse Braille plates on both sides of door frame entrances located 1500 mm (60 in.) to center above finished floor. Replace damaged or missing Braille plates.

H. Provide unique car number on every elevator entrance at designated main fire service floor level, minimum 75 mm (3 in.) in height.

I. Equip each hoistway entrance with a new electrical/mechanical interlock, functioning as hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position.

J. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.

2.43 CAR AND COUNTERWEIGHT GUIDES

A. Install four new adjustable roller guides, each assembled on a substantial metal base, to permit individual alignment to the guide rails.

B. Each guide shall consisting of not less than three (3) wheels, each with a durable, resilient oil-resistant material tire rotating on ball bearings having sealed-in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. Secure the roller guides at top and bottom on each side of car frame and counterweight frame. All mounting bolts shall be fitted with nuts, flat washers, split lock washers, and if required, beveled washers.

C. Provide sheet metal guards to protect rollers on top of car and counterweight.

D. Minimum diameter of car rollers shall be 150 mm (6 in.). The entire elevator car shall be properly balanced to equalize pressure on all guide rollers. Cars shall be balanced in post-wise and front-to-back directions. Test for this balanced condition shall be witnessed at time of final inspection.

E. Minimum diameter of counterweight rollers shall not be less than 100 mm (4 in.). Properly balance counterweight frame to equalize pressure on all guide rollers. The Contractor shall have the option of furnishing, for counterweight only, mechanically adjusted roller guide in lieu of spring-loaded roller guides as specified.

G. Equip car and counterweight with an auxiliary guiding device for each guide shoe which shall prevent the car or counterweight from leaving the rails if the normal guides fail. These auxiliary guides shall not, during normal operation, touch the guiding surfaces of the rails. The auxiliary guides may be an extension of the normal guide shoe mounting plate if that plate is fabricated from hot rolled steel. The portion of the auxiliary guide that contacts the rail guiding surfaces in the event of loss of the normal guides shall be lined with an approved bearing material to minimize damage to the rail guiding surfaces.

2.44 CAR FRAME: PASSENGER/SERVICE ELEVATORS

A. Reuse existing car frame. Tighten bolts and replace missing bolts.

2.45 CAR PLATFORM: PASSENGER/SERVICE ELEVATORS

A. Retain existing platform. Provide car entrances with new extruded nickel silver sill or better with machined or extruded guide grooves. Cover underside and all exposed edges of wood filled platform with sheet metal of not less than 26-gauge, with all exposed joints and edges folded under. Fire resistant paint is not acceptable. Platform shall have flexible composition flooring not less than 3 mm (.125 in.) thick. Adhesive material shall be type recommended by manufacturer of flooring. Lay flooring flush with threshold plate and base.

B. Provide a platform guard (toe guard) of not less than 12-guage sheet-steel on the entrance side, extend 76 mm (3 in.) beyond each side of entrance jamb. Securely brace platform guard to car platform, and bevel bottom edge at a 60-75-degree angle from horizontal. Install platform in the hoistway, so that the clearance between front edge and landing threshold shall not exceed 32 mm (1.25 in.).

C. Isolate the platform from the car frame by approved rubber pads or other equally effective means.

D. Provide adjustable diagonal brace rods to hold platform firmly within car suspension frame.

E. Balance car front to back and side to side. Provide balancing frame and weights, properly located, to achieve the required true balance.

F. Provide a bonding wire between frame and platform.

2.46 CAR ENCLOSURE: PASSENGER/SERVICE ELEVATORS BASE BID RETAIN EXISTING CAB SHELL

A. Retain existing car enclosure. P1-4 and S1-S4

B. Securely fasten car enclosure to platform by through bolts located at intervals of not more than 457 mm (18 in.) running through an angle at the base of panels to underside of platform.

C. Provide new front return wall panel, entrance columns, entrance head-jamb and transom shall be 14-gauge stainless steel. Transom shall be full width of cab. Retain existing side and rear walls. Coat exterior of walls with mastic sound insulation material approximately 2.5 mm (.09375 in.) thick followed by a prime coat of paint.

D. Provide new side and rear walls of passenger elevators with raised panels covered in fire rated materials approved for use in elevator interior.

E. Side and rear walls of service elevators, up to the center line of the top handrail, shall be covered with stainless steel. Side and rear walls to the ceiling shall be covered with stainless steel applied directly to the cab walls or raised panels. As designed by Architect. Submit a method of fastening panels to steel walls.

F. Provide car top railings.

H. Provide a hinged top emergency exit cover. Exit shall be unobstructed when open and shall have mechanical stops on the cover. Provide an exit switch to prevent operation of the elevator when the emergency exit is open.

I. Provide duplex, GFCI protected receptacle in car. Locate flush-mounted receptacle on the centerline of the main car operating panel, 150 mm (6 in.) above the car floor.

J. Lighting for passenger:

1. Provide stainless steel ceiling. As designed by Architect. Construct frame of .125 in. x 1.50 in. x 1.50 in. “T” and “L” sections divide ceiling into six panels.
2. Provide LED illuminated car light fixtures above the ceiling panels. Maintain a minimum light level of 50-foot candles at 914 mm (36 in.) above the finished floor.

K. Lighting for service elevators:

1. Provide car with indirect LED lamps mounted front to rear in lighting coves along each side of the cab ceiling, no hanging ceiling.

2. Equip the lighting cove with asymmetrical reflectors having specular finish. Maintain a minimum light level of 50-foot candles 914 mm (36 in.) above finished floor at the car operating panels.

L. Provide a blower unit arranged to exhaust through an opening in the canopy. Provide a stainless or chrome plated fan grill on the interior side of the opening. Provide screening over intake and exhaust end of blower. Provide 2-speed fan, with rated air displacement of 250 cfm and 400 cfm at respective speeds. Mount fan on top of car with rubber isolation to prevent transmission of vibration to car structure. Provide a 3-position switch to control the unit in the service panel.

M. Provide car enclosure with two sets of handrails with centerlines 750 mm and 1050 mm (30 in. and 42 in.) above the car floor.
   1. Locate handrails 38 mm (1.50 in.) from cab wall. Install handrails on side and rear walls. Conceal all handrail fastenings. Handrails shall be removable from inside the car enclosure.
   2. Provide service elevators with flat stock handrails with the ends at the entrance turned back to the wall.

N. Provide passenger and service car with single speed center opening horizontal sliding doors constructed the same as hoistway doors.

O. Provide one set of protective pads for service elevator of sufficient length to completely cover two sides, rear walls and front return of cab interior. Pads shall consist of a minimum of 6 mm (.25 in.) thick glass fiber insulation securely sewn between flame resistant vinyl coated coverings. Color of the covering shall be approved by the Contracting Officer. Provide stainless steel pad buttons or hooks, spaced at intervals of not more than 150 mm (18 in.) to adequately support pads.

2.46 CAR ENCLOSURE: PROVIDE NEW SERVICE ELEVATORS S2-S3 (ALTERNATE)

A. Provide new car enclosure. Maximize dome height inside the cab of minimum 2884 mm (9 ft). Intent is to provide two (2) new cab shells to maximize the height of the cab and to provide for a cartop extension for large items.
   1. Provide for rear of car enclosure to extend to a ceiling height of 12 ft. Cartop extension shall be width of cab.
   2. Provide for emergency exit panel to be installed in Cartop extension.
   3. Provide for LED lighting to be mounted flush to cartop ceiling.

B. Securely fasten car enclosure to platform by through bolts located at intervals of not more than 457 mm (18 in.) running through an angle at the base of panels to underside of platform.

C. Front return wall panel, entrance columns, entrance head-jamb and transom shall be 14-gauge stainless steel. Transom shall be full width of cab. Side and rear walls shall be constructed of 14-gauge cold rolled steel. Coat exterior of walls with mastic sound insulation material approximately 2.5 mm (.09375 in.) thick followed by a prime coat of paint.

D. Side and rear walls of passenger elevators may have raised panels covered in fire rated materials approved for use in elevator interior.

E. Side and rear walls of service elevators, up to the center line of the top handrail, shall be covered with stainless steel. Side and rear walls to the ceiling shall be covered with stainless steel applied directly to the cab walls or raised panels. As designed by Architect. Submit a method of fastening panels to steel walls.

F. Provide car top railings.

H. Provide a hinged top emergency exit cover. Exit shall be unobstructed when open and shall have mechanical stops on the cover. Provide an exit switch to prevent operation of the elevator when the emergency exit is open.

I. Provide duplex, GFCI protected receptacle in car. Locate flush-mounted receptacle on the centerline of the main car operating panel, 150 mm (6 in.) above the car floor.

J. Lighting for passenger:

1. Provide stainless steel ceiling. As designed by Architect. Construct frame of .125 in. x 1.50 in. x 1.50 in. “T” and “L” sections divide ceiling into six panels.
2. Provide LED illuminated car light fixtures above the ceiling panels. Maintain a minimum light level of 50-foot candles at 914 mm (36 in.) above the finished floor.

K. Lighting for service elevators:

1. Provide car with indirect LED lamps mounted front to rear in lighting coves along each side of the cab ceiling, no hanging ceiling.

2. Equip the lighting cove with asymmetrical reflectors having specular finish. Maintain a minimum light level of 50-foot candles 914 mm (36 in.) above finished floor at the car operating panels.

L. Provide a blower unit arranged to exhaust through an opening in the canopy. Provide a stainless or chrome plated fan grill on the interior side of the opening. Provide screening over intake and exhaust end of blower. Provide 2-speed fan, with rated air displacement of 250 cfm and 400 cfm at respective speeds. Mount fan on top of car with rubber isolation to prevent transmission of vibration to car structure. Provide a 3-position switch to control the unit in the service panel.

M. Provide car enclosure with two sets of handrails with centerlines 750 mm and 1050 mm (30 in. and 42 in.) above the car floor.
   1. Locate handrails 38 mm (1.50 in.) from cab wall. Install handrails on side and rear walls. Conceal all handrail fastenings. Handrails shall be removable from inside the car enclosure.
   2. Provide service elevators with flat stock handrails with the ends at the entrance turned back to the wall.

N. Provide passenger and service car with single speed center opening horizontal sliding doors constructed the same as hoistway doors.

O. Provide one set of protective pads for service elevator of sufficient length to completely cover two sides, rear walls and front return of cab interior. Pads shall consist of a minimum of 6 mm (.25 in.) thick glass fiber insulation securely sewn between flame resistant vinyl coated coverings. Color of the covering shall be approved by the Contracting Officer. Provide stainless steel pad buttons or hooks, spaced at intervals of not more than 150 mm (18 in.) to adequately support pads.

2.47 POWER DOOR OPERATORS: PASSENGER/SERVICE ELEVATORS

A. Provide new high-speed heavy-duty linear door operator to automatically open the car and hoistway doors simultaneously when the car is level with the floor, and automatically close the doors simultaneously at the expiration of the door-open time. Provide microprocessor door control with circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Motor shall be of the high-internal resistance type, capable of withstanding high currents resulting from stall without damage to door operator/motor. The door operator shall open the car door and hoistway door

simultaneously, at a speed up to .762 m (2.5 ft) per second. Closing speed of the doors shall be .305 m (1 ft) per second. Reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction of the infrared curtain or the door "OPEN" button, shall be accomplished within 38 mm (1.50 in.) maximum of door movement. Emphasis is placed on obtaining quiet interlock and door operation; smooth, fast, dynamic braking for door reversals, and stopping of the doors at extremes of travel.

B. Equip car doors with electric contact that prevents operation of car until doors are closed unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car.

C. Car and hoistway doors shall be manually operable in an emergency without disconnecting the power door operating equipment unless the car is outside the unlocking zone.
   1. It shall not be possible for the doors to open by power unless the elevator is within the leveling zone.
   2. Provide infrared curtain unit. The device shall cause the car and hoistway doors to reverse automatically to the fully open position should the unit be actuated while the doors are closing. Unit shall function when the doors are not closed, except during firefighter’s operation.

D. Should the doors be prevented from closing for more than a predetermined adjustable interval of 15 to 30 seconds by operation of the curtain unit, the doors shall stay open, the audio voice message and a buzzer located on the car shall sound only on automatic operation. Do not provide door nudging.
   1. If an obstruction of the doors should not activate the photo-electric door control device and prevent the doors from closing for more than a predetermined adjustable interval of 15 to 30 seconds, the doors shall reverse to the fully open position and remain open until the “Door Close” button re-establishes the closing cycle.

E. Provide door "OPEN" and "CLOSE" buttons. When the door "OPEN" button is pressed and held, the doors, if in the open position, shall remain open and if the doors are closing, they shall stop, reverse and re-open. Momentary pressure of the door "CLOSE" button shall initiate the

closing of the doors prior to the expiration of the normal door open time.

PART 3 – EXECUTION

3.1 PREPARATION

A. Examine work of other trades on which the work of this section depends. Report defects to the COR in writing that may affect the work of the elevator contractor.

B. Examine elevator hoistway openings for plumb, level, in line, and that elevator pit is proper size, waterproofed and drained with necessary access door, and ladder.

C. Examine machine room for proper illumination, heating, ventilation, electrical equipment, and beams are correctly located complete with access stairs and door.

D. Before fabrication, take necessary job site measurements, and verify where work is governed by other trades. Check measurement of space for equipment and means of access for installation and operation. Obtain dimensions from site for preparation of shop drawings.

E. Work required prior to the completion of the elevator installation:
   1. Supply of electric feeder wires to the terminals of the elevator control panel, including circuit breaker.
   2. Provide light and GFCI outlets in the elevator pit and machine room.
   3. Furnish electric power for testing and adjusting elevator equipment.
   4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.
   5. Supply power for cab lighting and ventilation from an emergency power panel specified in Division 26, ELECTRICAL.
   6. Machine room enclosed and protected from moisture, with self-closing, self-locking door and access stairs.
   7. Provide fire extinguisher in machine room.

3.2 ARRANGEMENT OF EQUIPMENT

A. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same machine room. Locate controller near and visible to its respective hoisting machine.

3.3 WORKMANSHIP, INSTALLATION, AND PROTECTION

A. Installations shall be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation shall be mechanically and electrically correct. Materials and equipment shall be new and without imperfections.

B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Contractor's work. All new holes in concrete shall be core drilled.

C. Structural members shall not be cut or altered. Work in place that is damaged or defaced shall be restored equal to original new condition.

D. Finished work shall be straight, plumb, level, and square with smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. At completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.

E. Sleeves for conduit and other small holes shall project 50 mm (2 in.) above concrete slabs.

F. Hoist cables that are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal or expanded metal guards.

G. Exposed gears, sprockets, and sheaves shall be guarded from accidental contact.

3.4 CLEANING

A. Clean machine room and equipment.

B. Perform hoistway clean down.

C. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish surfaces regarding type of material.

3.5 PAINTING AND FINISHING

A. All equipment, except specified as architectural finish, shall be painted one coat of approved color, conforming to manufacturer's standard.

B. Hoist machine, motor, shall be factory painted with manufacturer's standard finish and color.

C. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers except their machined surfaces, cams, brackets and all

other uncoated ferrous metal items shall be painted one factory primer coat or approved equal.

D. Stencil or apply decal floor designations not less than 100 mm (4 in.) high on hoistway doors, fascia or walls within door restrictor areas. The color of paint used shall contrast with the color of the surfaces to which it is applied.

E. Elevator hoisting machine, controller, governor, main line shunt trip circuit breaker, safety plank, and cross head of car shall be identified by 100 mm (4 in.) high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled or decaled.

F. Hoistway Entrances of Passenger, and Service Elevators:
   1. Door panels, except stainless steel surfaces, shall be given rust resistant treatment and a factory finish of one coat of baked-on primer and one factory finish coat of baked-on enamel.
   2. Fascia plates, top and bottom shear guards, dust covers, hanger covers, and other metalwork, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) shall be given one approved prime coat in the shop, and one field coat of paint of approved color.

G. Elevator Cabs for Passenger and Service Elevators:
   1. Interior and exterior steel surfaces shall be given rust resistant treatment before finish is applied.
   2. Interior steel surfaces shall be factory finished with one coat of paint of approved color.
   3. Give exterior faces of car doors one finish coat of paint of approved color.

H. Elevator Cabs for Passenger and Service Elevators:
   1. Interior and exterior steel surfaces shall be given rust resistant treatment before finish is applied.
   2. Interior steel surfaces shall be factory finished with one coat of paint of approved color.
   3. Give exterior faces of car doors one finish coat of paint of approved color.

3.6 PRE-TESTS AND TESTS

A. Pre-test the elevators and related equipment in the presence of the Contracting Officer or his authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by Contracting Officer.
   1. Contracting Officer shall obtain the services of an Independent QEI Certified Elevator Inspector. The QEI must utilize an Elevator Acceptance Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1, ASME A17.2, and contract documents. Upon completion of inspection and testing, the QEI must sign a copy of the completed form and provide to the Contracting Officer. Within 2 weeks of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the QEI will complete, sign, and provide a certificate of compliance provide by the VA.
   2. Government shall furnish electric power including necessary current for starting, testing, and operating machinery of each elevator.
   3. Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked certified test weights, voltmeter, amp probe, thermometers, direct reading tachometer, megohm meter, vibration meter, sound meter, light meter, stop watch, and a means of two-way communication.

B. Inspect workmanship, equipment furnished, and installation for compliance with specification.

C. Balance Tests: The percent of counterbalance shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counter balance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.

D. Full-Load Run Test: Elevator shall be tested for a period of one-hour continuous run with full contract load in the car. The test run shall consist of the elevator stopping at every floor, in either direction of travel, for not less than five or more than ten seconds per floor.

E. Speed Test: The actual speed of the elevator shall be determined in both directions of travel with full contract load and no load in the elevator. The actual measured speed of the elevator with all loads in either direction shall be within three (3) percent of specified rated speed. Full speed runs shall be quiet and free from vibration and sway.

F. Temperature Rise Test: The temperature rise of the hoisting motor shall be determined during the full load test run. Temperatures shall be measured using thermometers. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees Centigrade above ambient temperature. Test shall start when all machine room equipment is within five (5) degrees Centigrade of the ambient temperature. Other tests for heat runs on motors shall be performed as prescribed by the Institute of Electrical and Electronic Engineers.

G. Car Leveling Test: Elevator car leveling devices shall be tested for accuracy of leveling at all floors with no load in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (.125 in.) of level with landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 3 mm (.125 in.) of level with the landing floor regardless of change in load.

H. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator. Down stopping shall be tested with 125 percent of rated load in the elevator.

I. Insulation Resistance Test: The elevator's complete wiring system shall be free from short circuits and ground faults and the insulation resistance of the system shall be determined by use of megohm meter, at the discretion of the Elevator Inspector conducting the test.

J. Safety Devices: Car and counterweight safety devices shall be tested.

K. Overload Devices: Test all overload current protection devices in the system at final inspection.

L. Limit Stops:

1. The position of the car when stopped by each of the normal limit switches with no load and with contract load in the car shall be accurately measured.

2. Final position of the elevator relative to the terminal landings shall be determined when the elevator has been stopped by the final limits. The lower limit stop shall be made with contract load in the elevator. Elevator shall be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

M. Oil Buffer Tests: These tests shall be conducted with operating device and limit stops inoperative and with contract load in the elevator for the car buffer and with no load in the elevator for the counterweight buffer. Preliminary test shall be made at the lowest (leveling) speed. Final tests shall be conducted at contract speed. Buffers shall compress and return to the fully extended position without oil leakage.

N. Operating and Signal System: The elevator shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.

O. Performance of the Elevator supervisory system shall be witnessed and approved by the elevator inspector and a representative of the Contracting Officer.

P. If equipment fails test requirements and a re-inspection is required, the Contractor shall be responsible for the cost of re-inspection; salaries, transportation expenses, and per-diem expenses incurred by the elevator inspector and representative of the Contracting Officer.

3.7 INSTRUCTION TO VA PERSONNEL

A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one eight-hour day. Instruction shall commence after completion of all work and at the time and place directed by the Contracting Officer.

B. Written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories shall be furnished and delivered to the Resident Engineer in independently bound folders. DVD recordings will also be acceptable. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list of

with descriptive literature, and identification and diagrams of equipment and parts. Information shall also include electrical operation characteristics of all circuits, relays, timers, electronic devices, and related characteristics for all rotating equipment.

C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

3.8 INSPECTION AND MAINTENANCE SERVICE: GUARANTEE PERIOD OF SERVICE

A. Furnish complete inspection and maintenance service on entire elevator installation for a period of one (1) year after completion and acceptance of all the elevators in this specification by the COR. This maintenance service shall run concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.

B. Furnish complete preventive inspection, interim and warranty maintenance service on entire elevator installation for a period of one (1) year after completion and acceptance of all the car lifts in this specification by the Resident Engineer. This maintenance service shall begin concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.

1. Upon completion of the engineering phase and submittal process and not less than 30 days prior to mobilization of the project, Contractor to provide interim maintenance for all vertical transportation units being modernized or replaced. These units are as followsP1-P4 Gearless Traction Elevators, S1-S4 Gearless Traction Elevators, T-1 Geared Traction Cart-lift, and Building 10 Hydraulic Elevator 1.
2. Bi-Weekly systematic examination of equipment is required per 3.8.
3. Interim maintenance to be the responsibility of the Contractor until final acceptance of all vertical transportation units. Upon Final Acceptance, Contractor to be responsible for Warranty Maintenance for 12 months.

C. This contract will cover full maintenance including emergency call back service, inspections, and servicing the elevators listed in the schedule of elevators. The Elevator Contractor shall perform the following:

1. Bi-weekly systematic examination of equipment.
2. During each maintenance visit the Elevator Contractor shall clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in like new condition and proper working order.
3. Furnishing all lubricant, cleaning materials, parts and tools necessary to perform the work required. Lubricants shall be only those products recommended by the manufacturer of the equipment.
4. Equalizing tension, shorten or renew hoisting ropes.
5. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates, signal system, car safety device, governors, tension sheaves, and buffers shall be cleaned, lubricated and adjusted.
6. Guide rails, overhead sheaves and beams, counterweight frames, and bottom of platforms shall be cleaned every three months. Car tops and machine room floors shall be cleaned monthly. Accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Cleaning supplies and vacuum cleaner shall be furnished by the Contractor.
7. Maintain the performance standards set forth in this specification.
8. The operational system shall be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
9. Always maintain smooth starting and stopping and accurate leveling.

D. Maintenance service shall not include the performance of work required because of improper use, accidents, and negligence for which the Elevator Contractor is not directly responsible.

E. Provide 24-hour emergency call-back service that shall consist of promptly responding to calls within two hours for emergency service should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of persons and equipment in and about the elevator.

F. Service and emergency personnel shall report to the COR or his authorized representative upon arrival at the hospital and again upon

completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the COR or his authorized representative.

G. The Elevator Contractor shall maintain a log book in the machine room. The log shall list the date and time of all weekly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed, or parts replaced.

H. Written "Maintenance Control Program" shall be in place to maintain the equipment in compliance with ASME A17.1.

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SECTION 21 08 00
COMMISSIONING OF FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 21.

B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIRMENTS. A Commissioning Agent (CxA) appointed by the VA will manage the commissioning process.

1.2 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 SUMMARY

A. This Section includes requirements for commissioning the Fire Suppression systems, subsystems and equipment. This Section supplements the general requirements specified in Section 01 91 00 General Commissioning Requirements.

B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

1.4 DEFINITIONS

A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

1.5 COMMISSIONED SYSTEMS

A. Commissioning of a system or systems specified in Division 21 is part of the construction process. Documentation and testing of these systems, as well as training of the VA’s Operation and Maintenance personnel in accordance with the requirements of Section 01 91 00 and of Division 21, is required in cooperation with the VA and the Commissioning Agent.

B. The Fire Suppression systems commissioning will include the systems listed in Section 01 91 00 General Commissioning Requirements:

1.6 SUBMITTALS

A. The commissioning process requires review of selected Submittals. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.

B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION INSPECTIONS

A. Commissioning of the building fire suppression systems will require inspection of individual elements of the fire suppression construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent in accordance with Section 01 91 00 and the Commissioning plan to schedule inspections as required to support the Commissioning Process.

3.2 PRE-FUNCTIONAL CHECKLISTS

A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of

checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

3.3 CONTRACTOR'S TESTS

A. Contractor tests as required by other sections of Division 21 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the COR. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

3.5 TRAINING OF VA PERSONNEL

A. Training of the VA operation and maintenance personnel is required in cooperation with the COR and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the requirements of Section 01 91 00. The instruction shall be scheduled in coordination with the COR after submission and approval of formal

training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 21 Sections for additional Contractor training requirements.

---END---

SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Design, installation and testing shall be in accordance with NFPA 13.

B. Modification of the existing sprinkler system as indicated on the drawings and as further required by these specifications.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Section 07 84 00, FIRESTOPPING.

C. Section 09 91 00, PAINTING.

D. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING.

E. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 DESIGN CRITERIA

A. Design Basis Information: Provide design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system in accordance with the requirements of NFPA 13.

1. Perform hydraulic calculations in accordance with NFPA 13 utilizing the Area/Density method. Do not restrict design area reductions permitted for using quick response sprinklers throughout by the required use of standard response sprinklers in the areas identified in this section.

2. Sprinkler Protection: Sprinkler hazard classifications shall be in accordance with NFPA 13. The hazard classification examples of uses and conditions identified in the Annex of NFPA 13 shall be mandatory for areas not listed below. Request clarification from the Government for any hazard classification not identified. To determining spacing and sizing, apply the following coverage classifications:

a. Light Hazard Occupancies: Patient care, treatment, and customary access areas.

b. Ordinary Hazard Group 1 Occupancies: Laboratories, Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets, and Repair Shops.

c. Ordinary Hazard Group 2 Occupancies: Storage rooms, trash rooms, clean and soiled linen rooms, pharmacy and associated storage, laundry, kitchens, kitchen storage areas, retail stores, retail

store storage rooms, storage areas, building management storage, boiler plants, energy centers, warehouse spaces, file storage areas for the entire area of the space up to 140 square meters (1500 square feet) and Supply Processing and Distribution (SPD).

3. Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve.
4. Water Supply: Base water supply on a flow test of:
   a. Location _____
   b. Elevation Static Test Gauge _____ m (_____ ft)
   c. Elevation Residual Test Gauge _____ m (_____ ft)
   d. Static pressure: _____ kPa (_____ psi)
   e. Residual pressure: _____ kPa (_____ psi)
   f. Flow: _____ L/s (_____ gpm)
   g. Date: _____ Time _____
5. Zoning:
   a. Use existing zone control valves.
   b. Sprinkler zones shall conform to the smoke barrier zones shown on the drawings.
6. Provide seismic protection in accordance with NFPA 13. Contractor shall submit load calculations for sizing of sway bracing for systems that are required to be protected against damage from earthquakes.

1.4 SUBMITTALS

A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Prepare detailed working drawings that are signed by a NICET Level III or Level IV Sprinkler Technician or stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering. As the Government review is for technical adequacy only, the installer remains responsible for correcting any conflicts with other trades and building construction that arise during installation. Partial submittals will not be accepted. Material submittals shall be approved prior to the purchase or delivery to the job site. Suitably bind submittals in notebooks or binders and provide an index referencing the appropriate specification

section. In addition to the hard copies, provide submittal items in Paragraphs 1.4(A) 1 through 1.4(A) 5 electronically in pdf format on a compact disc or as directed by the COR. Submittals shall include the following:

1. Qualifications:
   a. Provide a copy of the installing contractors fire sprinkler and state contractor's license.
   b. Provide a copy of the NICET certification for the NICET Level III or Level IV Sprinkler Technician who prepared and signed the detailed working drawings unless the drawings are stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering.
   c. Provide documentation showing that the installer has been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.
2. Drawings: Submit detailed 1:100 (1/8 inch) scale (minimum) working drawings conforming to the Plans and Calculations chapter of NFPA 13. Drawings shall include graphical scales that allow the user to determine lengths when the drawings are reduced in size. Include a plan showing the piping to the water supply test location.
3. Manufacturer's Data Sheets: Provide data sheets for all materials and equipment proposed for use on the system. Include listing information and installation instructions in data sheets. Where data sheets describe items in addition to those proposed to be used for the system, clearly identify the proposed items on the sheet.
4. Calculation Sheets:
   a. Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of the Plans and Calculations chapter of NFPA 13.
   b. Submit calculations of loads for sizing of sway bracing in accordance with NFPA 13.
5. Valve Charts: Provide a valve chart that identifies the location of each control valve. Coordinate nomenclature and identification of control valves with COR. Where existing nomenclature does not exist, the chart shall include no less than the following: Tag ID No., Valve Size, Service (control valve, main drain, aux. drain, inspectors test valve) and Location.

6. Final Document Submittals: Provide as-built drawings, testing and maintenance instructions in accordance with the requirements in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. In addition, submittals shall include the following:
   a. A complete set of as-built drawings showing the installed system with the specific interconnections between the system switches and the fire alarm equipment. Provide a complete set in the formats as follows. Submit items 2 and 3 below on a compact disc or as directed by the COR.
      1) One full size (or size as directed by the COR) printed copy.
      2) One complete set-in electronic pdf format.
      3) One complete set in AutoCAD format or a format as directed by the COR.
   b. Material and Testing Certificate: Upon completion of the sprinkler system installation or any partial section of the system, including testing and flushing, provide a copy of a completed Material and Testing Certificate as indicated in NFPA 13. Certificates shall be provided to document all parts of the installation.
   c. Operations and Maintenance Manuals that include step-by-step procedures required for system startup, operation, shutdown, and routine maintenance and testing. The manuals shall include the manufacturer's name, model number, parts list, and tools that should be kept in stock by the owner for routine maintenance, including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization, including address and telephone number, for each item of equipment.
   d. One paper copy of the Material and Testing Certificates and the Operations and Maintenance Manuals above shall be provided in a binder. In addition, these materials shall be provided in pdf format on a compact disc or as directed by the COR.
   e. Provide one additional copy of the Operations and Maintenance Manual covering the system in a flexible protective cover and mount in an accessible location adjacent to the riser or as directed by the COR.

1.5 QUALITY ASSURANCE

A. Installer Reliability: The installer shall possess a valid State of New Mexico fire sprinkler contractor's license. The installer shall have been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.

B. Materials and Equipment: All equipment and devices shall be of a make and type listed by UL or approved by FM, or other nationally recognized testing laboratory for the specific purpose for which it is used. All materials, devices, and equipment shall be approved by the VA. All materials and equipment shall be free from defect. All materials and equipment shall be new unless specifically indicated otherwise on the contract drawings.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. National Fire Protection Association (NFPA):

13-13.....Installation of Sprinkler Systems

25-14.....Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

101-15.....Life Safety Code

170-15.....Fire Safety Symbols

C. Underwriters Laboratories, Inc. (UL):

Fire Protection Equipment Directory (2011)

D. Factory Mutual Engineering Corporation (FM):

Approval Guide

PART 2 - PRODUCTS

2.1 PIPING & FITTINGS

A. Piping and fittings for private underground water mains shall be in accordance with NFPA 13.

1. Pipe and fittings from inside face of building 300 mm (12 in.) above finished floor to a distance of approximately 1500 mm (5 ft.) outside building: Ductile Iron, flanged fittings and 316 stainless steel bolting.

B. Piping and fittings for sprinkler systems shall be in accordance with NFPA 13.

1. Plain-end pipe fittings with locking lugs or shear bolts are not permitted.
2. Piping sizes 50 mm (2 inches) and smaller shall be black steel Schedule 40 with threaded end connections.
3. Piping sizes 65 mm (2 ½ inches) and larger shall be black steel Schedule 10 with grooved connections. Grooves in Schedule 10 piping shall be rolled grooved only.
4. Use nonferrous piping in MRI Scanning Rooms.
5. Plastic piping shall not be permitted except for drain piping.
6. Flexible sprinkler hose shall be FM Approved and limited to hose with threaded end fittings with a minimum inside diameter or 1-inch and a maximum length of 6-feet.

2.2 VALVES

A. General:
   1. Valves shall be in accordance with NFPA 13.
   2. Do not use quarter turn ball valves for 50 mm (2 inch) or larger drain valves.

B. Control Valve: The control valves shall be a listed indicating type. Control valves shall be UL Listed or FM Approved for fire protection installations. System control valve shall be rated for normal system pressure but in no case less than 175 PSI.

C. Check Valve: Shall be of the swing type with a flanged cast iron body and flanged inspection plate.

D. Automatic Ball Drips: Cast brass 20 mm (3/4 inch) in-line automatic ball drip with both ends threaded with iron pipe threads.

2.3 SPRINKLERS

A. All sprinklers shall be FM approved quick response except "institutional" type sprinklers shall be permitted to be UL Listed quick response. Maximum break away strength shall be certified by the manufacturer to be no more than 39 kPa (85 pounds). Provide FM approved quick response sprinklers in all areas, except that standard response sprinklers shall be provided in freezers, refrigerators, elevator hoistways, elevator machine rooms, and generator rooms.

B. Temperature Ratings: In accordance with NFPA 13 except that sprinklers in elevator shafts and elevator machine rooms shall be no less than intermediate temperature rated and sprinklers in generator rooms shall be no less than high temperature rated.

C. Provide sprinkler guards in accordance with NFPA 13 and when the elevation of the sprinkler head is less than 7 feet 6 inches above finished floor. The sprinkler guard shall be UL listed or FM approved for use with the corresponding sprinkler.

2.4 SPRINKLER CABINET

A. Provide sprinkler cabinet with the required number of sprinkler heads of all ratings and types installed, and a sprinkler wrench for each type of sprinkler in accordance with NFPA 13. Locate adjacent to the riser.

B. Provide a list of sprinklers installed in the property in the cabinet. The list shall include the following:

1. Manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure for each type of sprinkler in the cabinet.
2. General description of where each sprinkler is used.
3. Quantity of each type present in the cabinet.
4. Issue or revision date of list.

2.5 SPRINKLER SYSTEM SIGNAGE

A. Rigid plastic, steel or aluminum signs with white lettering on a red background with holes for easy attachment. Sprinkler system signage shall be attached to the valve or piping with chain.

2.6 SWITCHES:

A. OS&Y Valve Supervisory Switches shall be in a weatherproof die cast/red baked enamel, oil resistant, aluminum housing with tamper resistant screws, 13 mm (1/2 inch) conduit entrance and necessary facilities for attachment to the valves. Provide two SPDT switches rated at 2.5 amps at 24 VDC.

B. Water flow Alarm Switches: Mechanical, non-coded, non-accumulative retard and adjustable from 0 to 60 seconds minimum. Set flow switches at an initial setting between 20 and 30 seconds.

C. Alarm Pressure Switches: Activation by any flow of water equal to or in excess of the discharge from one sprinkler. The alarm pressure switch shall be UL Listed or Factory Mutual Approved for the application in which it is used. Activation of the alarm pressure switch shall cause an alarm on the fire alarm system control unit.

D. Valve Supervisory Switches for Ball and Butterfly Valves: May be integral with the valve.

2.7 GAUGES

A. Provide gauges as required by NFPA 13. Provide gauges where the normal pressure of the system is at the midrange of the gauge.

2.8 PIPE HANGERS, SUPPORTS AND RESTRAINT OF SYSTEM PIPING

A. Pipe hangers, supports, and restraint of system piping shall be in accordance with NFPA 13.

B. The contractor shall provide wire guard for all sprinkler heads in telecommunications, security, and bio medical rooms.

2.9 WALL, FLOOR AND CEILING PLATES

A. Provide chrome plated steel escutcheon plates.

2.10 ANTIFREEZE SOLUTION

A. Antifreeze solution shall be in accordance with NFPA 13 and shall be compatible with use in a potable water supply.

2.11 VALVE TAGS

A. Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 8 mm (1/4 inch) for service designation on 19 gage, 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook, brass chain, or nylon twist tie.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be accomplished by the licensed contractor. Provide a qualified technician, experienced in the installation and operation of the type of system being installed, to supervise the installation and testing of the system.

B. Installation of Piping: Accurately cut pipe to measurements established by the installer and work into place without springing or forcing. In any situation where bending of the pipe is required, use a standard pipe-bending template. Concealed piping in spaces that have finished ceilings. Where ceiling mounted equipment exists, such as in operating and radiology rooms, install sprinklers so as not to obstruct the movement or operation of the equipment. Sidewall heads may need to be utilized. In stairways, locate piping as near to the ceiling as possible to prevent tampering by unauthorized personnel and to provide a minimum headroom clearance of 2250 mm (seven feet six inches). Piping shall not obstruct the minimum means of egress clearances required by

NFPA 101. Pipe hangers, supports, and restraint of system piping, and seismic bracing shall be installed accordance with NFPA 13.

C. Welding: Conform to the requirements and recommendations of NFPA 13.

D. Drains: Provide drips and drains, including low point drains, in accordance with NFPA 13. Pipe drains to discharge at safe points outside of the building or to sight cones attached to drains of adequate size to readily carry the full flow from each drain under maximum pressure. Do not provide a direct drain connection to sewer system or discharge into sinks. Install drips and drains where necessary and required by NFPA 13. The drain piping shall not be restricted or reduced and shall be of the same diameter as the drain collector.

E. Supervisory Switches: Provide supervisory switches for sprinkler control valves.

F. Waterflow Alarm Switches: Install waterflow alarm switches and valves in stairwells or other easily accessible locations.

G. Inspector's Test Connection: Install and supply in accordance with NFPA 13, locate in a secured area, and discharge to the exterior of the building.

H. Affix cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections to the respective waterflow switch or pipe connection near to the pipe from where they were cut.

I. Provide escutcheon plates for exposed piping passing through walls, floors or ceilings.

J. Clearances: For systems requiring seismic protection, piping that passes through floors or walls shall have penetrations sized 50 mm (2 inches) nominally larger than the penetrating pipe for pipe sizes 25 mm (1 inch) to 90 mm (3 ½ inches) and 100 mm (4 inches) nominally larger for penetrating pipe sizes 100 mm (4 inches) and larger.

K. Sleeves: Provide for pipes passing through masonry or concrete. Provide space between the pipe and the sleeve in accordance with NFPA 13. Seal this space with a UL Listed through penetration fire stop material in accordance with Section 07 84 00, FIRESTOPPING. Where core drilling is used in lieu of sleeves, also seal space. Seal penetrations of walls, floors and ceilings of other types of construction, in accordance with Section 07 84 00, FIRESTOPPING.

L. Provide pressure gauges at each water flow alarm switch location and at each main drain connection.

M. For each fire department connection, provide the symbolic sign given in NFPA 170 and locate 2400 to 3000 mm (8 to 10 feet) above each connection location. Size the sign to 450 by 450 mm (18 by 18 inches) with the symbol being at least 350 by 350 mm (14 by 14 inches).

N. Firestopping shall be provided for all penetrations of fire resistance rated construction. Firestopping shall comply with Section 07 84 00, FIRESTOPPING.

O. Painting of Pipe: In finished areas where walls and ceilings have been painted, paint primed surfaces with two coats of paint to match adjacent surfaces, except paint valves and operating accessories with two coats of gloss red enamel. Exercise care to avoid painting sprinklers. Painting of sprinkler systems above suspended ceilings and in crawl spaces is not required. Painting shall comply with Section 09 91 00, PAINTING. Any painted sprinkler shall be replaced with a new sprinkler.

P. Sprinkler System Signage: Provide rigid sprinkler system signage in accordance with NFPA 13 and NFPA 25. Sprinkler system signage shall include the following:

1. Identification Signs:
   a. Provide signage for each control valve, drain valve, sprinkler cabinet, and inspector’s test.
   b. Provide valve tags for each operable valve. Coordinate nomenclature and identification of operable valves with COR. Where existing nomenclature does not exist, the Tag Identification shall include no less than the following: (FP-B-F/SZ-#) Fire Protection, Building Number, Floor Number/Smoke Zone (if applicable), and Valve Number. (E.g., FP-500-1E-001) Fire Protection, Building 500, First Floor East, Number 001.)
2. Instruction/Information Signs:
   a. Provide signage for each control valve to indicate valve function and to indicate what system is being controlled.
   b. Provide signage indicating the number and location of low point drains.
3. Hydraulic Placards:

a. Provide signage indicating hydraulic design information. The placard shall include location of the design area, discharge densities, required flow and residual pressure at the base of riser, occupancy classification, hose stream allowance, flow test information, and installing contractor. Locate hydraulic placard information signs at each alarm check valve.

Q. Repairs: Repair damage to the building or equipment resulting from the installation of the sprinkler system by the installer at no additional expense to the Government.

R. Interruption of Service: There shall be no interruption of the existing sprinkler protection, water, electric, or fire alarm services without prior permission of the Contracting Officer's Representative (COR). Contractor shall develop an interim fire protection program where interruptions involve occupied spaces. Request in writing at least one week prior to the planned interruption.

3.2 INSPECTION AND TEST

A. Preliminary Testing: Flush newly installed systems prior to performing hydrostatic tests in order to remove any debris which may have been left as well as ensuring piping is unobstructed. Hydrostatically test system, including the fire department connections, as specified in NFPA 13, in the presence of the COR or his designated representative. Test and flush underground water line prior to performing these hydrostatic tests.

B. Final Inspection and Testing: Subject system to tests in accordance with NFPA 13, and when all necessary corrections have been accomplished, advise COR to schedule a final inspection and test. Connection to the fire alarm system shall have been in service for at least ten days prior to the final inspection, with adjustments made to prevent false alarms. Furnish all instruments, labor and materials required for the tests and provide the services of the installation foreman or other competent representative of the installer to perform the tests. Correct deficiencies and retest system as necessary, prior to the final acceptance. Include the operation of all features of the systems under normal operations in test.

3.3 INSTRUCTIONS

A. Furnish the services of a competent instructor for not less than two hours for instructing personnel in the operation and maintenance of the system, on the dates requested by the COR.

---END---

SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section shall apply to all sections of Division 22.

B. Definitions:

1. Exposed: Piping and equipment exposed to view in finished rooms.

C. Abbreviations/Acronyms:

1. ABS: Acrylonitrile Butadiene Styrene
2. AC: Alternating Current
3. ACR: Air Conditioning and Refrigeration
4. AI: Analog Input
5. AISI: American Iron and Steel Institute
6. AO: Analog Output
7. AWG: American Wire Gauge
8. BACnet: Building Automation and Control Network
9. BAg: Silver-Copper-Zinc Brazing Alloy
10. BAS: Building Automation System
11. BCuP: Silver-Copper-Phosphorus Brazing Alloy
12. BSG: Borosilicate Glass Pipe
13. CDA: Copper Development Association
14. C: Celsius
15. CLR: Color
16. CO: Carbon Monoxide
17. COR: Contracting Officer’s Representative
18. CPVC: Chlorinated Polyvinyl Chloride
19. CR: Chloroprene
20. CRS: Corrosion Resistant Steel
21. CWP: Cold Working Pressure
22. CxA: Commissioning Agent
23. db(A): Decibels (A weighted)
24. DDC: Direct Digital Control
25. DI: Digital Input
26. DISS: Diameter Index Safety System
27. DO: Digital Output
28. DVD: Digital Video Disc
29. DN: Diameter Nominal

30. DWV: Drainage, Waste and Vent
31. ECC: Engineering Control Center
32. EPDM: Ethylene Propylene Diene Monomer
33. EPT: Ethylene Propylene Terpolymer
34. ETO: Ethylene Oxide
35. F: Fahrenheit
36. FAR: Federal Acquisition Regulations
37. FD: Floor Drain
38. FED: Federal
39. FG: Fiberglass
40. FNPT: Female National Pipe Thread
41. FPM: Fluoroelastomer Polymer
42. GPM: Gallons Per Minute
43. HDPE: High Density Polyethylene
44. Hg: Mercury
45. HOA: Hands-Off-Automatic
46. HP: Horsepower
47. HVE: High Volume Evacuation
48. ID: Inside Diameter
49. IPS: Iron Pipe Size
50. Kg: Kilogram
51. kPa: Kilopascal
52. lb: Pound
53. L/s: Liters Per Second
54. L/min: Liters Per Minute
55. MAWP: Maximum Allowable Working Pressure
56. MAX: Maximum
57. MED: Medical
58. m: Meter
59. MFG: Manufacturer
60. mg: Milligram
61. mg/L: Milligrams per Liter
62. ml: Milliliter
63. mm: Millimeter
64. MIN: Minimum
65. NF: Oil Free Dry (Nitrogen)
66. NPTF: National Pipe Thread Female

67. NPS: Nominal Pipe Size
68. NPT: Nominal Pipe Thread
69. OD: Outside Diameter
70. OSD: Open Sight Drain
71. OS&Y: Outside Stem and Yoke
72. OXY: Oxygen
73. PBPU: Prefabricated Bedside Patient Units
74. PH: Power of Hydrogen
75. PLC: Programmable Logic Controllers
76. PP: Polypropylene
77. PPM: Parts per Million
78. PSIG: Pounds per Square Inch
79. PTFE: Polytetrafluoroethylene
80. PVC: Polyvinyl Chloride
81. PVDF: Polyvinylidene Fluoride
82. RAD: Radians
83. RO: Reverse Osmosis
84. RPM: Revolutions Per Minute
85. RTRP: Reinforced Thermosetting Resin Pipe
86. SCFM: Standard Cubic Feet Per Minute
87. SDI: Silt Density Index
88. SPEC: Specification
89. SPS: Sterile Processing Services
90. STD: Standard
91. SUS: Saybolt Universal Second
92. SWP: Steam Working Pressure
93. TEFC: Totally Enclosed Fan-Cooled
94. TFE: Tetrafluoroethylene
95. THHN: Thermoplastic High-Heat Resistant Nylon Coated Wire
96. THWN: Thermoplastic Heat & Water Resistant Nylon Coated Wire
97. T/P: Temperature and Pressure
98. USDA: U.S. Department of Agriculture
99. V: Volt
100. VAC: Vacuum
101. VA: Veterans Administration
102. VAMC: Veterans Administration Medical Center
103. VAC: Voltage in Alternating Current

104. WAGD: Waste Anesthesia Gas Disposal

105. WOG: Water, Oil, Gas

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

D. Section 05 50 00, METAL FABRICATIONS.

E. Section 07 84 00, FIRESTOPPING.

F. Section 07 92 00, JOINT SEALANTS.

G. Section 09 91 00, PAINTING.

H. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

I. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.

J. Section 22 07 11, PLUMBING INSULATION.

K. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

L. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

M. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

N. Section 26 29 11, MOTOR CONTROLLERS.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below shall form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

C. American Society for Testing and Materials (ASTM):

A36/A36M-2019.....Standard Specification for Carbon Structural Steel

A575-96(R2018)e1.....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

E84-2019b.....Standard Test Method for Surface Burning Characteristics of Building Materials

E119-2019.....Standard Test Methods for Fire Tests of Building Construction and Materials

F1760-2016.....Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content

D. International Code Council, (ICC):

IBC-2018.....International Building Code

IPC-2018.....International Plumbing Code

E. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:

SP-58-2018.....Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation

SP-69-2003(R2012).....Pipe Hangers and Supports - Selection and Application

F. Military Specifications (MIL):

P-21035B.....Paint High Zinc Dust Content, Galvanizing Repair (Metric)

H. National Fire Protection Association (NFPA):

51B-2019.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

54-2018.....National Fuel Gas Code

70-2019.....National Electrical Code (NEC)

I. NSF International (NSF):

14-2019.....Plastic Piping System Components and Related Materials

61-2019.....Drinking Water System Components – Health Effects

372-2016.....Drinking Water System Components – Lead Content

J. Department of Veterans Affairs (VA):

PG-18-10.....Plumbing Design Manual

PG-18-13-2011.....Barrier Free Design Guide

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.

C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.

D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and

associated systems, including accessibility, are equivalent to that required by the contract.

E. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.

F. Installing Contractor shall provide lists of previous installations for selected items of equipment. Contact persons who will serve as references, with telephone numbers and e-mail addresses shall be submitted with the references.

G. Manufacturer's Literature and Data: Manufacturer’s literature shall be submitted under the pertinent section rather than under this section.
   1. Electric motor data and variable speed drive data shall be submitted with the driven equipment.
   2. Equipment and materials identification.
   3. Firestopping materials.
   4. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
   5. Wall, floor, and ceiling plates.

H. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.

I. Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8 inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and adequate clearance for all equipment, controls, piping, pumps, valves and other items. All valves, trap primer valves, water hammer arrestors, strainers, and equipment requiring service shall be provided with an access door sized for the complete removal of plumbing device,

component, or equipment. Equipment foundations shall not be installed until equipment or piping layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.

1. Mechanical equipment rooms.
2. Interstitial space.
3. Hangers, inserts, supports, and bracing.
4. Pipe sleeves.
5. Equipment penetrations of floors, walls, ceilings, or roofs.

J. Maintenance Data and Operating Instructions:

1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment. Include complete list indicating all components of the systems with diagrams of the internal wiring for each item of equipment.
2. Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

1.5 QUALITY ASSURANCE

A. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least 5 years.
2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 160 km (100 miles) of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Names, mail and e-mail addresses and phone numbers of service organizations

providing service under these conditions for (as applicable to the project): pumps, compressors, water heaters, critical instrumentation, computer workstation and programming shall be submitted for project record and inserted into the operations and maintenance manual.

3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
4. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply. Any conflicts shall be brought to the attention of the COR.
5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
8. Asbestos products or equipment or materials containing asbestos shall not be used.

B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:

1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
2. Comply with provisions of ASME B31 series "Code for Pressure Piping".

3. Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
4. All welds shall be stamped according to the provisions of the American Welding Society.

C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

D. Execution (Installation, Construction) Quality:
1. All items shall be applied and installed in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the COR for resolution. Printed copies or electronic files of manufacturer’s installation instructions shall be provided to the COR at least 10 working days prior to commencing installation of any item.
2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to COR for resolution.
3. Complete layout drawings shall be required by Paragraph, SUBMITTALS. Construction work shall not start on any system until the layout drawings have been approved by VA.
4. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.

5. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or additional time to the Government.

E. Guaranty: Warranty of Construction, FAR clause 52.246-21.

F. Plumbing Systems: IPC, International Plumbing Code. Unless otherwise required herein, perform plumbing work in accordance with the latest version of the IPC. For IPC codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall". Reference to the "code official" or "owner" shall be interpreted to mean the COR.

G. Cleanliness of Piping and Equipment Systems:

1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Government. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC). All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:

1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
2. Damaged equipment shall be replaced with an identical unit as determined and directed by the COR. Such replacement shall be at no additional cost or additional time to the Government.
3. Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.

4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

1.7 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three-ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them on Auto-Cad version 2016 provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

2.1 MATERIALS FOR VARIOUS SERVICES

A. Non-pressure PVC pipe shall contain a minimum of 25 percent recycled content. Steel pipe shall contain a minimum of 25 percent recycled content.

B. Plastic pipe, fittings and solvent cement shall meet NSF 14 and shall bear the NSF seal "NSF-PW". Polypropylene pipe and fittings shall comply with NSF 14 and NSF 61. Solder or flux containing lead shall not be used with copper pipe.

C. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption and shall be certified in accordance with NSF 61 or NSF 372.

D. In-line devices such as water meters, building valves, check valves, stops, valves, fittings, tanks and backflow preventers shall comply with NSF 61 and NSF 372.

E. End point devices such as drinking fountains, lavatory faucets, kitchen and bar faucets, ice makers supply stops, and end-point control valves used to dispense drinking water must meet requirements of NSF 61 and NSF 372.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.

1. All components of an assembled unit need not be products of same manufacturer.
2. Constituent parts that are alike shall be products of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.
4. Contractor shall guarantee performance of assemblies of components and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly at no additional cost or time to the Government.

C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate

securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment, which serve the same function, shall be the same make and model.

2.3 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.4 SAFETY GUARDS

A. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gage sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 8 mm (1/4 inch) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.

B. All Equipment shall have moving parts protected from personal injury.

2.5 LIFTING ATTACHMENTS

A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.6 ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING

A. All material and equipment furnished and installation methods used shall conform to the requirements of Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT; Section 26 29 11, MOTOR CONTROLLERS; and, Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES. All electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems shall be provided. Premium efficient motors shall be provided. Unless otherwise specified for a particular application, electric motors shall have the following requirements.

B. Special Requirements:

1. Where motor power requirements of equipment furnished deviate from power shown on plans, provide electrical service designed under the

requirements of NFPA 70 without additional cost or time to the Government.

2. Assemblies of motors, starters, and controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.
3. Wire and cable materials specified in the electrical division of the specifications shall be modified as follows:
   a. Wiring material located where temperatures can exceed 71° C (160° F) shall be stranded copper with Teflon FEP insulation with jacket. This includes wiring on the boilers and water heaters.
   b. Other wiring at boilers and water heaters, and to control panels, shall be NFPA 70 designation THWN.
   c. Shielded conductors or wiring in separate conduits for all instrumentation and control systems shall be provided where recommended by manufacturer of equipment.
4. Motor sizes shall be selected so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
5. Motors utilized with variable frequency drives shall be rated "inverter-ready" per NEMA Standard, MG1.

C. Motor Efficiency and Power Factor: All motors, when specified as "high efficiency or Premium Efficiency" by the project specifications on driven equipment, shall conform to efficiency and power factor requirements in Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT, with no consideration of annual service hours. Motor manufacturers generally define these efficiency requirements as "NEMA premium efficient" and the requirements generally exceed those of the Energy Policy Act (EPACT), revised 2005. Motors not specified as "high efficiency or premium efficient" shall comply with EPACT.

D. Single-phase Motors: Capacitor-start type for hard starting applications. Motors for centrifugal pumps may be split phase or permanent split capacitor (PSC).

E. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type. Each two-speed motor shall have two separate windings. A time delay (20 seconds minimum) relay shall be provided for switching from high to low speed.

F. Rating: Rating shall be continuous duty at 100 percent capacity in an ambient temperature of 40° C (104° F); minimum horsepower as shown on drawings; maximum horsepower in normal operation shall not exceed nameplate rating without service factor.

G. Insulation Resistance: Not less than one-half meg-ohm between stator conductors and frame shall be measured at the time of final inspection.

2.7 EQUIPMENT AND MATERIALS IDENTIFICATION

A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings, or shown in the maintenance manuals. Coordinate equipment and valve identification with local VAMC shops. In addition, provide bar code identification nameplate for all equipment which shall allow the equipment identification code to be scanned into the system for maintenance and inventory tracking. Identification for piping is specified in Section 09 91 00, PAINTING.

B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 7 mm (3/16 inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING shall be permanently fastened to the equipment. Unit components such as water heaters, tanks, coils, and filters shall be identified.

C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 7 mm (3/16 inch) high riveted or bolted to the equipment.

D. Control Items: All temperature, pressure, and controllers shall be labeled, and the component’s function identified. Identify and label each item as they appear on the control diagrams.

E. Valve Tags and Lists:

1. Plumbing: All valves shall be provided with valve tags and listed on a valve list (Fixture stops not included).
2. Valve tags: Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 8 mm (1/4 inch) for service designation on 19 gage, 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
3. Valve lists: Valve lists shall be created using a word processing program and printed on plastic coated cards. The plastic-coated valve list card(s), sized 215 mm (8-1/2 inches) by 275 mm (11 inches) shall show valve tag number, valve function and area of

control for each service or system. The valve list shall be in a punched 3-ring binder notebook. An additional copy of the valve list shall be mounted in picture frames for mounting to a wall. COR shall instruct contractor where frames shall be mounted.

4. A detailed plan for each floor of the building indicating the location and valve number for each valve shall be provided in the 3-ring binder notebook. Each valve location shall be identified with a color-coded sticker or thumb tack in ceiling or access door.

2.8 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping. Refer to Section 22 07 11, PLUMBING INSULATION, for pipe insulation.

2.9 GALVANIZED REPAIR COMPOUND

A. Mil. Spec. DOD-P-21035B, paint.

2.10 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

A. In lieu of the paragraph which follows, suspended equipment support and restraints may be designed and installed in accordance with the International Building Code (IBC) and Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS. Submittals based on the International Building Code (IBC) and Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS requirements, or the following paragraphs of this Section shall be stamped and signed by a professional engineer registered in the state where the project is located. The Support system of suspended equipment over 227 kg (500 pounds) shall be submitted for approval of the COR in all cases. See the above specifications for lateral force design requirements.

B. Type Numbers Specified: For materials, design, manufacture, selection, application, and installation refer to MSS SP-58. For selection and application refer to MSS SP-69. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting.

C. For Attachment to Concrete Construction:

1. Concrete insert: Type 18, MSS SP-58.
2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 100 mm (4 inches) thick when approved by the COR for each job condition.

3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 100 mm (4 inches) thick when approved by the COR for each job condition.

D. For Attachment to Steel Construction: MSS SP-58.
   1. Welded attachment: Type 22.
   2. Beam clamps: Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 23 mm (7/8 inch) outside diameter.

E. For Attachment to Wood Construction: Wood screws or lag bolts.

F. Hanger Rods: Hot-rolled steel, ASTM A36/A36M or ASTM A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 40 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.

G. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 43 mm by 43 mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts.
   1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).
   2. Guide individual pipes on the horizontal member of every other trapeze hanger with 8 mm (1/4 inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 15 mm (1/2 inch) galvanized steel bands, or insulated calcium silicate shield for insulated piping at each hanger.

H. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping. Refer to Section 22 07 11, PLUMBING INSULATION for insulation thickness. To protect insulation, provide Type 39 saddles for roller type supports or insulated calcium silicate shields. Provide Type 40 insulation shield or insulated calcium silicate shield at all other types of supports and hangers including those for insulated piping.
   1. General Types (MSS SP-58):
      a. Standard clevis hanger: Type 1; provide locknut.
      b. Riser clamps: Type 8.
      c. Wall brackets: Types 31, 32 or 33.
      d. Roller supports: Type 41, 43, 44 and 46.
      e. Saddle support: Type 36, 37 or 38.
      f. Turnbuckle: Types 13 or 15.

g. U-bolt clamp: Type 24.

h. Copper Tube:

1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, copper-coated, plastic coated or taped with isolation tape to prevent electrolysis.

2) For vertical runs use epoxy painted, copper-coated or plastic-coated riser clamps.

3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.

4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.

i. Supports for plastic or glass piping: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp.

j. Spring hangers are required on all plumbing system pumps one horsepower and greater.

2. Plumbing Piping (Other Than General Types):

a. Horizontal piping: Type 1, 5, 7, 9, and 10.

b. Chrome plated piping: Chrome plated supports.

c. Hangers and supports in pipe chase: Prefabricated system ABS self-extinguishing material, not subject to electrolytic action, to hold piping, prevent vibration and compensate for all static and operational conditions.

d. Blocking, stays, and bracing: Angle iron or preformed metal channel shapes, 1.3 mm (18 gage) minimum.

I. Pre-insulated Calcium Silicate Shields:

1. Provide 360 degree water resistant high density 965 kPa (140 psig) compressive strength calcium silicate shields encased in galvanized metal.

2. Pre-insulated calcium silicate shields to be installed at the point of support during erection.

3. Shield thickness shall match the pipe insulation.

4. The type of shield is selected by the temperature of the pipe, the load it must carry, and the type of support it will be used with.

a. Shields for supporting cold water shall have insulation that extends a minimum of 25 mm (1 inch) past the sheet metal.
b. The insulated calcium silicate shield shall support the maximum allowable water filled span as indicated in MSS SP-69. To support the load, the shields shall have one or more of the following features: structural inserts 4138 kPa (600 psig) compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36/A36M) wear plates welded to the bottom sheet metal jacket.

5. Shields may be used on steel clevis hanger type supports, trapeze hangers, roller supports or flat surfaces.

J. Seismic Restraint of Piping: Refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

2.11 PIPE PENETRATIONS

A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays.
B. Pipe penetration sleeve materials shall comply with all firestopping requirements for each penetration.
C. To prevent accidental liquid spills from passing to a lower level, provide the following:
   1. For sleeves: Extend sleeve 25 mm (1 inch) above finished floor and provide sealant for watertight joint.
   2. For blocked out floor openings: Provide 40 mm (1-1/2 inch) angle set in silicone adhesive around opening.
   3. For drilled penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.
D. Penetrations are not allowed through beams or ribs, but may shall be installed in concrete beam flanges, with structural engineer prior approval. Any deviation from these requirements must receive prior approval of COR.
E. Sheet metal, plastic, or moisture resistant fiber sleeves shall be provided for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
F. Cast iron or zinc coated pipe sleeves shall be provided for pipe passing through exterior walls below grade. The space between the

sleeve and pipe shall be made watertight with a modular or link rubber seal. The link seal shall be applied at both ends of the sleeve.

G. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. A galvanized steel sleeve shall be provided for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, sleeves shall be connected with a floor plate.

H. Brass Pipe Sleeves shall be provided for pipe passing through quarry tile, terrazzo or ceramic tile floors. The sleeve shall be connected with a floor plate.

I. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 25 mm (1 inch) greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation plus 25 mm (1 inch) in diameter. Interior openings shall be caulked tight with firestopping material and sealant to prevent the spread of fire, smoke, water and gases.

J. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS. Bio-based materials shall be utilized when possible.

2.12 TOOLS AND LUBRICANTS

A. Furnish, and turn over to the COR, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.

C. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the COR.

D. Lubricants: A minimum of 0.95 L (1 quart) of oil, and 0.45 kg (1 pound) of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application. Bio-based materials shall be utilized when possible.

2.13 WALL, FLOOR AND CEILING PLATES

A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.

B. Thickness: Not less than 2.4 mm (3/32 inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025 inch) for up to 75 mm (3 inch) pipe, 0.89 mm (0.035 inch) for larger pipe.

C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Wall plates shall be used where insulation ends on exposed water supply pipe drop from overhead. A watertight joint shall be provided in spaces where brass or steel pipe sleeves are specified.

2.14 ASBESTOS

A. Materials containing asbestos are not permitted.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping, sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review.

B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.

C. Operating Personnel Access and Observation Provisions: All equipment and systems shall be arranged to provide clear view and easy access, without use of portable ladders, for maintenance, testing and operation of all devices including, but not limited to: all equipment items, valves, backflow preventers, filters, strainers, transmitters, sensors, meters and control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Maintenance and operating space and access provisions that are shown on the drawings shall not be changed nor reduced.

D. Structural systems necessary for pipe and equipment support shall be coordinated to permit proper installation.

E. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

F. Cutting Holes:
   1. Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by COR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to COR for approval.
   2. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
   3. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by COR where working area space is limited.

G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other services are not shown but must be provided.

H. Protection and Cleaning:
   1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the COR. Damaged or defective items in the opinion of the COR, shall be replaced at no additional cost or time to the Government.
   2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Pipe openings, equipment, and plumbing fixtures shall be tightly covered against dirt or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

I. Gages, thermometers, valves and other devices shall be installed with due regard for ease in reading or operating and maintaining said devices. Thermometers and gages shall be located and positioned to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

J. Interconnection of Controls and Instruments: Electrical interconnection is generally not shown but shall be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations. Comply with NFPA 70.

K. Many plumbing systems interface with the HVAC control system. See the HVAC control points list and Section 23 09 23, DIRECT DIGITAL CONTROL SYSTEM FOR HVAC.

L. Work in Existing Building:

1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01 00 00, GENERAL REQUIREMENTS for relocation of existing equipment, alterations and restoration of existing building(s).
2. As specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will cause the least interfere with normal operation of the facility.

M. Switchgear Drip Protection: Every effort shall be made to eliminate the installation of pipe above data equipment, and electrical and telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum of joints. Drain valve shall be provided in low point of casement pipe.

N. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost or additional time to the Government.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as electrical conduit, motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.2 TEMPORARY PIPING AND EQUIPMENT

A. Continuity of operation of existing facilities may require temporary installation or relocation of equipment and piping. Temporary equipment

or pipe installation or relocation shall be provided to maintain continuity of operation of existing facilities.

B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The requirements of paragraph 3.1 shall apply.

C. Temporary facilities and piping shall be completely removed back to the nearest active distribution branch or main pipeline and any openings in structures sealed. Dead legs are not allowed in potable water systems. Necessary blind flanges and caps shall be provided to seal open piping remaining in service.

3.3 RIGGING

A. Openings in building structures shall be planned to accommodate design scheme.

B. Alternative methods of equipment delivery may be offered and will be considered by Government under specified restrictions of phasing and service requirements as well as structural integrity of the building.

C. All openings in the building shall be closed when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.

D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility.

E. Contractor shall check all clearances, weight limitations and shall provide a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.

F. Rigging plan and methods shall be referred to COR for evaluation prior to actual work.

3.4 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Holes shall be drilled or

burned in structural steel ONLY with the prior written approval of the COR.

B. The use of chain pipe supports, wire or strap hangers; wood for blocking, stays and bracing, or hangers suspended from piping above shall not be permitted. Rusty products shall be replaced.

C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. A minimum of 15 mm (1/2 inch) clearance between pipe or piping covering and adjacent work shall be provided.

D. For horizontal and vertical plumbing pipe supports, refer to the International Plumbing Code (IPC) and these specifications.

E. Overhead Supports:

1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
3. Tubing and capillary systems shall be supported in channel troughs.

F. Floor Supports:

1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Concrete bases and structural systems shall be anchored and doweled to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
2. Bases and supports shall not be located and installed until equipment mounted thereon has been approved. Bases shall be sized to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Structural drawings shall be reviewed for additional requirements. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a grout material to permit alignment and realignment.
4. For seismic anchoring, refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

3.5 LUBRICATION

A. All equipment and devices requiring lubrication shall be lubricated prior to initial operation. All devices and equipment shall be field checked for proper lubrication.

B. All devices and equipment shall be equipped with required lubrication fittings. A minimum of one liter (one quart) of oil and 0.45 kg (1 pound) of grease of manufacturer's recommended grade and type for each different application shall be provided. All materials shall be delivered to COR in unopened containers that are properly identified as to application.

C. A separate grease gun with attachments for applicable fittings shall be provided for each type of grease applied.

D. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.

E. All lubrication points shall be extended to one side of the equipment.

3.6 PLUMBING SYSTEMS DEMOLITION

A. Rigging access, other than indicated on the drawings, shall be provided after approval for structural integrity by the COR. Such access shall be provided without additional cost or time to the Government. Where work is in an operating plant, approved protection from dust and debris shall be provided at all times for the safety of plant personnel and maintenance of plant operation and environment of the plant.

B. In an operating plant, cleanliness and safety shall be maintained. The plant shall be kept in an operating condition. Government personnel will be carrying on their normal duties of operating, cleaning and maintaining equipment and plant operation. Work shall be confined to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Dust and debris shall not be permitted to accumulate in the area to the detriment of plant operation. All flame cutting shall be performed to maintain the fire safety integrity of this plant. Adequate fire extinguishing facilities shall be available at all times. All work shall be performed in accordance with recognized fire protection standards including NFPA 51B. Inspections will be made by personnel of the VA Medical Center, and the Contractor shall follow all directives of the COR with regard to rigging, safety, fire safety, and maintenance of operations.

C. Unless specified otherwise, all piping, wiring, conduit, and other devices associated with the equipment not re-used in the new work shall be completely removed from Government property. This includes all concrete equipment pads, pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. All openings shall be sealed after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.

D. All valves including gate, globe, ball, butterfly and check, all pressure gages and thermometers with wells shall remain Government property and shall be removed and delivered to COR and stored as directed. The Contractor shall remove all other material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from Government property expeditiously and shall not be allowed to accumulate. Coordinate with the COR and Infection Control.

E. Asbestos Insulation Removal: Conform to Section 02 82 13.13, GLOVEBAG ASEBSTOS ABATEMENT.

3.7 CLEANING AND PAINTING

A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Government, the plant facilities, equipment and systems shall be thoroughly cleaned and painted. Refer to Section 09 91 00, PAINTING.

B. In addition, the following special conditions apply:

1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks. All rust shall be removed prior to painting and from surfaces to remain unpainted. Scratches, scuffs, and abrasions shall be repaired prior to applying prime and finish coats.
2. The following Material and Equipment shall NOT be painted:
   a. Motors, controllers, control switches, and safety switches.
   b. Control and interlock devices.
   c. Regulators.

d. Pressure reducing valves.

e. Control valves and thermostatic elements.

f. Lubrication devices and grease fittings.

g. Copper, brass, aluminum, stainless steel and bronze surfaces.

h. Valve stems and rotating shafts.

i. Pressure gages and thermometers.

j. Glass.

k. Name plates.

3. Control and instrument panels shall be cleaned, and damaged surfaces repaired. Touch-up painting shall be made with matching paint type and color obtained from manufacturer or computer matched.
4. Pumps, motors, steel and cast-iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same paint type and color as utilized by the pump manufacturer.
5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats per Section 09 91 00, Painting.
6. The final result shall be a smooth, even-colored, even-textured factory finish on all items. The entire piece of equipment shall be repainted, if necessary, to achieve this. Lead based paints shall not be used.

3.8 IDENTIFICATION SIGNS

A. Laminated plastic signs, with engraved lettering not less than 7 mm (3/16 inch) high, shall be provided that designates equipment function, for all equipment, switches, motor controllers, relays, meters, control devices, including automatic control valves. Nomenclature and identification symbols shall correspond to that used in maintenance manual, and in diagrams specified elsewhere. Attach by chain, adhesive, or screws.

B. Factory Built Equipment: Metal plate, securely attached, with name and address of manufacturer, serial number, model number, size, and performance data shall be placed on factory-built equipment.

C. Pipe Identification: Refer to Section 09 91 00, PAINTING.

3.9 STARTUP AND TEMPORARY OPERATION

A. Startup of equipment shall be performed as described in the equipment specifications. Vibration within specified tolerance shall be verified prior to extended operation. Temporary use of equipment is specified in

Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.

3.10 OPERATING AND PERFORMANCE TESTS

A. Prior to the final inspection, all required tests shall be performed as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TESTS and submit the test reports and records to the COR.

B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.

C. When completion of certain work or systems occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then conduct such performance tests and finalize control settings during the first actual seasonal use of the respective systems following completion of work. Rescheduling of these tests shall be requested in writing to COR for approval.

3.11 OPERATION AND MAINTENANCE MANUALS

A. All new and temporary equipment and all elements of each assembly shall be included.

B. Data sheet on each device listing model, size, capacity, pressure, speed, horsepower, impeller size, and other information shall be included.

C. Manufacturer’s installation, maintenance, repair, and operation instructions for each device shall be included. Assembly drawings and parts lists shall also be included. A summary of operating precautions and reasons for precautions shall be included in the Operations and Maintenance Manual.

D. Lubrication instructions, type and quantity of lubricant shall be included.

E. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications shall be included.

F. Set points of all interlock devices shall be listed.

G. Trouble-shooting guide for the control system troubleshooting shall be inserted into the Operations and Maintenance Manual.

H. The control system sequence of operation corrected with submittal review comments shall be inserted into the Operations and Maintenance Manual.

I. Emergency procedures for shutdown and startup of equipment and systems.

3.13 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for four hours to instruct VA Personnel in operation and maintenance of the system.

---END---

SECTION 22 05 12
GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the general motor requirements for plumbing equipment and applies to all sections of Division 22.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

E. Section 26 29 11, MOTOR CONTROLLERS: Starters, control and protection of motors.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Bearing Manufacturers Association (ABMA):

ABMA 9–1990 (R2008) Load Ratings and Fatigue Life for Ball Bearings

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

841-2009 IEEE Standard for Petroleum and Chemical Industry-Premium-Efficiency, Severe-Duty, Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors--Up to and Including 370 kW (500 HP)

D. International Code Council (ICC):

IPC-2012 International Plumbing Code

E. National Electrical Manufacturers Association (NEMA):

MG 1-2011 Motors and Generators

MG 2-2001 (R2007) Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

250-2008 Enclosures for Electrical Equipment (1000 Volts Maximum)

F. National Fire Protection Association (NFPA):

70-2011 National Electrical Code (NEC)

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT", with applicable paragraph identification.

C. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Motor nameplate information shall be submitted including electrical ratings, dimensions, mounting details, materials, horsepower, power factor, current as a function of speed, current efficiency, speed as a function of load, RPM, enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.
3. Motor parameters required for the determination of the Reed Critical Frequency of vertical hollow shaft motors shall be submitted.

D. Operating and Maintenance Manuals: Companion copies of complete maintenance and operating manuals, including technical data sheets and application data shall be submitted simultaneously with the shop drawings. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:

1. Include complete list indicating all components of the systems.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

E. Certification: Two weeks prior to final inspection, unless otherwise noted, the following certification shall be submitted to the Contracting Officer's Representative (COR).

1. Certification shall be submitted stating that the motors have been properly applied, installed, adjusted, lubricated, and tested.

PART 2 - PRODUCTS

2.1 MOTORS

A. For alternating current, fractional and integral horsepower motors, NEMA MG 1 and NEMA MG 2 shall apply.

B. For severe duty totally enclosed motors, IEEE 841 shall apply.

C. Voltage ratings shall be as follows:

1. Single phase:
   a. Motors connected to 120-volt systems: 115 volts.
   b. Motors connected to 208-volt systems: 200 volts.
   c. Motors connected to 240-volt or 480-volt systems: 230/460 volts, dual connection.
2. Three phase:
   a. Motors connected to 208-volt systems: 200 volts.
   b. Motors, less than 100 hp (74.6 kW), connected to 240-volt or 480-volt systems: 230/460 volts, dual connection.
   c. Motors, 100 hp (74.6 kW) or larger, connected to 240-volt systems: 230 volts.
   d. Motors, 100 hp (74.6 kW) or larger, connected to 480-volt systems: 460 volts.
   e. Motors connected to high voltage systems: Shall conform to NEMA MG 1 Standards for connection to the nominal system voltage shown on the drawings.

D. Number of phases shall be as follows:

1. Motors, less than 1/2 hp (373 W): Single phase.
2. Motors, 1/2 hp (373 W) and larger: 3 phase.
3. Exceptions:
   a. Hermetically sealed motors.
   b. Motors for equipment assemblies, less than 1 hp (746 kW), maybe single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.

E. Horsepower ratings shall be adequate for operating the connected loads continuously in the prevailing ambient temperatures in areas where the motors are installed, without exceeding the NEMA standard temperature rises for the motor insulation.

F. Motor designs, as indicated by the NEMA code letters, shall be coordinated with the connected loads to assure adequate starting,

acceleration and running torque without exceeding nameplate ratings or considering service factor.

G. Motor Enclosures:
   1. Shall be the NEMA types shown on the drawings for the motors.
   2. Where the types of motor enclosures are not shown on the drawings, they shall be the NEMA types per NEMA 250, which are most suitable for the environmental conditions where the motors are being installed.
   3. Enclosures shall be primed and finish coated at the factory with manufacturer's prime coat and standard finish.
   4. All motors in hazardous locations shall be approved for the application and meet the Class and Group as required by the area classification.

H. Electrical Design Requirements:
   1. Motors shall be continuous duty.
   2. The insulation system shall be rated minimum of Class B, 266 degrees F (130 degrees C).
   3. The maximum temperature rise by resistance at rated power shall not exceed Class B limits, 144 degrees F (80 degrees C).
   4. The speed/torque and speed/current characteristics shall comply with NEMA Design A or B, as specified.
   5. Motors shall be suitable for full voltage starting, unless otherwise noted. Coordinate motor features with applicable motor controllers.
   6. Motors for variable frequency drive applications shall adhere to NEMA MG 1, Part 30, Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable Voltage or Adjustable Frequency Controls, or both, or NEMA MG 1, Part 31, Definite Purpose Inverter Fed Polyphase Motors.

I. Mechanical Design Requirements:
   1. Bearings shall be rated for a minimum fatigue life of 26,280 hours for belt-driven loads and 100,000 hours for direct-drive loads based on L10 (Basic Rating Life) at full load direct coupled, except vertical high thrust motors which require a 40,000 hour rating. A minimum fatigue life of 40,000 hours is required for VFD drives.
   2. Vertical motors shall be capable of withstanding a momentary up thrust of at least 30 percent of normal down thrust.

3. Grease lubricated bearings shall be designed for electric motor use. Grease shall be capable of the temperatures associated with electric motors and shall be compatible with Polyurea based greases.
4. Grease fittings, if provided, shall be Alemite type or equivalent.
5. Oil lubricated bearings, when specified, shall have an externally visible sight glass to view oil level.
6. Vibration shall not exceed 0.15 inch (3.8 mm) per second, unfiltered peak.
7. Noise level shall meet the requirements of the application.
8. Motors on 180 frames and larger shall have provisions for lifting eyes or lugs capable of a safety factor of 5.
9. All external fasteners shall be corrosion resistant.
10. Condensation heaters, when specified, shall keep motor windings at least 9 degrees F (5 degrees C) above ambient temperature.
11. Winding thermostats, when specified shall be normally closed, connected in series.
12. Grounding provisions shall be in the main terminal box.

J. Additional requirements for specific motors, as indicated in other sections, shall also apply.

K. NEMA Premium Efficiency Electric Motors, Motor Efficiencies: All permanently wired polyphase motors of 1 hp (746 W) or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 1 hp (746 W) or more with open, drip-proof or totally enclosed fan-cooled enclosures shall be NEMA premium efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

Minimum Efficiencies Open Drip-Proof				Minimum Efficiencies Totally Enclosed Fan-Cooled			
Rating hp (kW)	1200 RPM	1800 RPM	3600 RPM	Rating kW (HP)	1200 RPM	1800 RPM	3600 RPM
1 (0.746)	82.5%	85.5%	77.0%	1 (0.746)	82.5%	85.5%	77.0%
1.5 (1.12)	86.5%	86.5%	84.0%	1.5 (1.12)	87.5%	86.5%	84.0%
2 (1.49)	87.5%	86.5%	85.5%	2 (1.49)	88.5%	86.5%	85.5%
3 (2.24)	88.5%	89.5%	85.5%	3 (2.24)	89.5%	89.5%	86.5%

L. Minimum Power Factor at Full Load and Rated Voltage: 90 percent at 1200 RPM, 1800 RPM and 3600 RPM. Power factor correction capacitors shall be installed unless the motor is controlled by a variable frequency drive. The power factor correction capacitors shall be able to withstand high voltage transients and power line variations without breakdown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install motors in accordance with manufacturer's recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

B. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.2 FIELD TESTS

A. Megger all motors after installation, before start-up. All shall test free from grounds.

---END---

SECTION 22 05 19
METERS AND GAUGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the requirements for water meters and gauges primarily used for troubleshooting the system and to indicate system performance.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

B40.100-2013.....Pressure Gauges and Gauge Attachments

B40.200-2008.....Thermometers, Direct Reading and Remote Reading

C. American Water Works Association (AWWA):

C700-2009.....Standard for Cold Water Meters, Displacement Type, Bronze Main Case

C701-2012.....Cold Water Meters-Turbine Type, for Customer Service

C702-2010.....Cold Water Meters – Compound Type

C706-2010.....Direct-Reading, Remote-Registration Systems for Cold-Water Meters

D. Institute of Electrical and Electronics Engineers (IEEE):

C2-2012.....National Electrical Safety Code (NESC)

E. International Code Council (ICC):

IPC-2012.....International Plumbing Code

F. National Fire Protection Association (NFPA):

70-2011.....National Electrical Code (NEC)

G. NSF International (NSF):

61-2012.....Drinking Water System Components – Health Effects

372-2011.....Drinking Water System Components – Lead Content

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 19, METERS AND GAUGES FOR PLUMBING PIPING", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. Water Meter.
2. Pressure Gauges.
3. Thermometers.
4. Product certificates for each type of meter and gauge.
5. BACnet communication protocol.

D. Operations and Maintenance manual shall include:

1. System Description.
2. Major assembly block diagrams.
3. Troubleshooting and preventive maintenance guidelines.
4. Spare parts information.

E. Shop Drawings shall include the following: One line, wiring and terminal diagrams including terminals identified, protocol or communication modules, and Ethernet connections.

1.5 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit copies of complete operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three-ring binder per the requirements of Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. A list of

recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner willbe required to employ shall be inserted into the As-Built documentation.

PART 2 – PRODUCTS

2.1 PRESSURE GAUGES FOR WATER AND SEWAGE USAGE

A. ASME B40.100 all metal case 4-1/2 inches (115 mm) diameter, bottom connected throughout, graduated as required for service, and identity labeled. Range shall be 0 to 200 psig (0 to 1380 kPa) gauge.
B. The pressure element assembly shall be bourdon tube. The mechanical movement shall be lined to pressure element and connected to pointer.
C. The dial shall be non-reflective aluminum with permanently etched scale markings graduated in kPa and psig.
D. The pointer shall be dark colored metal.
E. The window shall be glass.
F. The ring shall be brass or stainless steel.
G. The accuracy shall be grade A, plus or minus 1 percent of middle half of scale range.
H. The pressure gauge for water domestic use shall conform to **NSF 61** and NSF 372.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Direct mounted pressure gauges shall be installed in piping tees with pressure gauge located on pipe at the most readable position.
B. Valves and snubbers shall be installed in piping for each pressure gauge.
C. Test plugs shall be installed on the inlet and outlet pipes of all heat exchangers or water heaters serving more than one plumbing fixture.
D. Pressure gauges shall be installed where indicated on the drawings and at the following locations:
    1. Building water service entrance into building.
    2. Inlet and outlet of each pressure reducing valve.
    3. Suction and discharge of each domestic water pump or re-circulating hot water return pump.
E. Remote readout register shall be mounted at the location indicated on the drawings or as directed by the COR.

F. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.3 TRAINING

A. A training course shall be provided to the medical center on meter configuration and maintenance. Training manuals shall be supplied for all attendees with four additional copies supplied. The training course shall cover meter configuration, troubleshooting, and diagnostic procedures.

---END---

SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the requirements for general-duty valves for domestic water and sewer systems.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

A112.14.1-2003 .....Backwater Valves

C. American Society of Sanitary Engineering (ASSE):

1001-2008 .....Performance Requirements for Atmospheric Type Vacuum Breakers

1003-2009 .....Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems

1011-2004 .....Performance Requirements for Hose Connection Vacuum Breakers

1013-2011 .....Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers

1015-2011 .....Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

1017-2009 .....Performance Requirements for Temperature

D. Actuated Mixing Valves for Hot Water Distribution Systems

1020-2020 .....Performance Requirements for Pressure Vacuum Breaker Assembly

1035-2008 .....Performance Requirements for Laboratory Faucet Backflow Preventers

1069-2020 .....Performance Requirements for Automatic Temperature Control Mixing Valves

1070-2015 .....Performance Requirements for Water Temperature Limiting Devices

1071-2012 .....Performance Requirements for Temperature Actuated Mixing Valves for Plumbed Emergency Equipment

E. American Society for Testing and Materials (ASTM):

A126-2004(R2019) .....Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

A276-2013a .....Standard Specification for Stainless Steel Bars and Shapes

A536-1984(R2019) .....Standard Specification for Ductile Iron Castings

B62-2017 Standard Specification for Composition Bronze or Ounce Metal Castings

B584-2014 .....Standard Specification for Copper Alloy Sand Castings for General Applications

F. International Code Council (ICC):

IPC-2018 .....International Plumbing Code

G. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):

SP-25-2018 .....Standard Marking Systems for Valves, Fittings, Flanges and Unions

SP-67-2017 .....Butterfly Valves

SP-70-2011 .....Gray Iron Gate Valves, Flanged and Threaded Ends

SP-71-2018 .....Gray Iron Swing Check Valves, Flanged and Threaded Ends

SP-80-2019 .....Bronze Gate, Globe, Angle, and Check Valves

SP-85-2011 .....Gray Iron Globe & Angle Valves, Flanged and Threaded Ends

SP-110-2010 .....Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

H. National Environmental Balancing Bureau (NEBB):

7th Edition 2005 ......Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems

University of Southern California Foundation for Cross Connection

I. Control and Hydraulic Research (USC FCCCHR):

9th Edition ....Manual of Cross-Connection Control

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING", with applicable paragraph identification.

C. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. Ball Valves.
2. Gate Valves.
3. Check Valves.

D. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:

1. Include complete list indicating all components of the systems.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.
4. Piping diagrams of thermostatic mixing valves to be installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Valves shall be prepared for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Valves shall be prepared for storage as follows:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew point temperature.

PART 2 - PRODUCTS

2.1 VALVES, GENERAL

A. Asbestos packing and gaskets are prohibited.

B. Bronze valves shall be made with dezincification resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc shall not be permitted.

C. Valves in insulated piping shall have 2 inch (50 mm) stem extensions and extended handles of non-thermal conductive material that allows operating the valve without breaking the vapor seal or disturbing the insulation. Memory stops shall be fully adjustable after insulation is applied.

2.2 SHUT-OFF VALVES

A. Cold, Hot and Re-circulating Hot Water:
   1. 2 inches (50 mm) and smaller: Ball, MSS SP-110, Ball valve shall be full port three piece or two piece with a union design with adjustable stem package. Threaded stem designs are not allowed. The ball valve shall have a SWP rating of 150 psig (1035 kPa) and a CWP rating of 600 psig (4138 kPa). The body material shall be Bronze ASTM B584, Alloy C844. The ends shall be non-lead solder.
   2. Less than 4 inches (100 mm): Butterfly shall have an iron body with EPDM seal and aluminum bronze disc. The butterfly valve shall meet MSS SP-67, type I standard. The butterfly valve shall have a SWP rating of 200 psig (1380 kPa). The valve design shall be lug type suitable for bidirectional dead-end service at rated pressure. The body material shall meet ASTM A536, ductile iron.
   3. 4 inches (100 mm) and larger:
      a. Class 125, OS&Y, Cast Iron Gate Valve. The gate valve shall meet MSS SP-70 type I standard. The gate valve shall have a CWP rating of 200 psig (1380 kPa). The valve materials shall meet ASTM A126, grey iron with bolted bonnet, flanged ends, bronze trim, and positive-seal resilient solid wedge disc. The gate valve shall be

gear operated for sizes under 8 inches (200 mm) and crank operated for sizes 8 inches (200 mm) and above.

2.4 CHECK VALVES

A. 3 inches (75 mm) and smaller shall be Class 125, bronze swing check valves with non-metallic disc suitable for type of service. The check valve shall meet MSS SP-80 Type 4 standard. The check valve shall have a CWP rating of 200 psig (1380 kPa). The check valve shall have a Y pattern horizontal body design with bronze body material conforming to ASTM B62, solder joints, and PTFE or TFE disc.

B. 4 inches (100 mm) and larger:

1. Check valves shall be Class 125, iron swing check valve with lever and weight closure control. The check valve shall meet MSS SP-71 Type I standard. The check valve shall have a CWP rating of 200 psig (1380 kPa). The check valve shall have a clear or full waterway body design with gray iron body material conforming to ASTM A126, bolted bonnet, flanged ends, bronze trim.
2. All check valves on the discharge side of submersible sump pumps shall have factory installed exterior level and weight with sufficient weight to prevent the check valve from hammering against the seat when the sump pump stops.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Valve interior shall be examined for cleanliness, freedom from foreign matter, and corrosion. Special packing materials shall be removed, such as blocks, used to prevent disc movement during shipping and handling.

B. Valves shall be operated in positions from fully open to fully closed. Guides and seats shall be examined and made accessible by such operations.

C. Threads on valve and mating pipe shall be examined for form and cleanliness.

D. Mating flange faces shall be examined for conditions that might cause leakage. Bolting shall be checked for proper size, length, and material. Gaskets shall be verified for proper size and that its material composition is suitable for service and free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Valves shall be located for easy access and shall be provide with separate support. Valves shall be accessible with access doors when installed inside partitions or above hard ceilings.

C. Valves shall be installed in horizontal piping with stem at or above center of pipe.

D. Valves shall be installed in a position to allow full stem movement.

E. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.4 ADJUSTING

A. Valve packing shall be adjusted or replaced after piping systems have been tested and put into service but before final adjusting and balancing. Valves shall be replaced if persistent leaking occurs.

3.6 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for four hours to instruct VA Personnel in operation and maintenance of the system.

- - E N D - - -

SECTION 22 07 11
PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Field applied insulation for thermal efficiency and condensation control for the following:
   1. Plumbing piping and equipment.
   2. Re-insulation of plumbing piping and equipment after asbestos abatement and or replacement of any part of existing insulation system (insulation, vapor retarder jacket, protective coverings/jacket) damaged during construction.

B. Definitions:
   1. ASJ: All Service Jacket, Kraft paper, white finish facing or jacket.
   2. Air-conditioned space: Space having air temperature and/or humidity controlled by mechanical equipment.
   3. All insulation systems installed within supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, interiors of air conditioned or heating ducts, and mechanical equipment rooms shall be noncombustible or shall be listed and labeled as having a flame spread indexes of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723. Note: ICC IMC, Section 602.2.1.
   4. Cold: Equipment or piping handling media at design temperature of 15 degrees C (60 degrees F) or below.
   5. Concealed: Piping above ceilings and in chases, interstitial space, and pipe spaces.
   6. Exposed: Piping and equipment exposed to view in finished areas including mechanical equipment rooms or exposed to outdoor weather. Shafts, chases, interstitial spaces, unfinished attics, crawl spaces and pipe basements are not considered finished areas.
   7. FSK: Foil-scrim-Kraft facing.
   8. Hot: Plumbing equipment or piping handling media above 40 degrees C (104 degrees F).
   9. Density: kg/m^3 - kilograms per cubic meter (Pcf - pounds per cubic foot).

10. Thermal conductance: Heat flow rate through materials.
    a. Flat surface: Watts per square meter (BTU per hour per square foot).
    b. Pipe or Cylinder: Watts per linear meter (BTU per hour per linear foot) for a given outside diameter.
11. Thermal Conductivity (k): Watts per meter, per degree K (BTU - inch thickness, per hour, per square foot, per degree F temperature difference).
12. Vapor Retarder (Vapor Barrier): A material which retards the transmission (migration) of water vapor. Performance of the vapor retarder is rated in terms of permeance (perms). For the purpose of this specification, vapor retarders/vapor barriers shall have a maximum published permeance of .02 perms.
13. HWR: Hot water recirculating.
14. CW: Cold water.
15. SW: Soft water.
16. HW: Hot water.
17. PVDC: Polyvinylidene chloride vapor retarder jacketing, white.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.
D. Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT: Insulation containing asbestos material.
E. Section 07 84 00, FIRESTOPPING: Mineral fiber and bond breaker behind sealant.
F. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING: General mechanical requirements and items, which are common to more than one section of Division 22.
G. Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING: Hot and cold water piping.
H. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING: Hot and cold water piping.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

B209-2014..... Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C411-2019 Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

C449-2007 (R2013).....Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement

C450-2018.....Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging

Adjunct to C450..... Compilation of Tables that Provide Recommended Dimensions for Prefab and Field Thermal Insulating Covers, etc.

C533-2017..... Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation

C534/C534M-2019..... Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

C547-2019..... Standard Specification for Mineral Fiber Pipe Insulation

C552-2018..... Standard Specification for Cellular Glass Thermal Insulation

C553-2019..... Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

C591-2019..... Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

C680-2019..... Standard Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs

C612-2014..... Standard Specification for Mineral Fiber Block and Board Thermal Insulation

C1126-2019.....Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation

C1136-2017..... Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

C1710-2016..... Standard Guide for Installation of Flexible Closed Cell Preformed Insulation in Tube and Sheet Form

D1668/D1668M-1997a(2014) e1 Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing

E84-2019b..... Standard Test Method for Surface Burning Characteristics of Building Materials

E2231-2019..... Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation to Assess Surface Burning Characteristics

C. Federal Specifications (Fed. Spec.):

L-P-535E-1979..... Plastic Sheet (Sheeting): Plastic Strip; Poly (Vinyl Chloride) and Poly (Vinyl Chloride - Vinyl Acetate), Rigid.

D. International Code Council, (ICC):

IMC-2018..... International Mechanical Code

E. Military Specifications (Mil. Spec.):

MIL-A-3316C (2)-1990.... Adhesives, Fire-Resistant, Thermal Insulation

MIL-A-24179A (2)-1987... Adhesive, Flexible Unicellular-Plastic Thermal Insulation

MIL-PRF-19565C (1)-1988.Coating Compounds, Thermal Insulation, Fire-and Water-Resistant, Vapor-Barrier

MIL-C-20079H-1987.....Cloth, Glass; Tape, Textile Glass; and Thread, Glass and Wire-Reinforced Glass

F. National Fire Protection Association (NFPA):

90A-2018..... Standard for the Installation of Air-Conditioning and Ventilating Systems

G. Underwriters Laboratories, Inc (UL):

723-2018..... Standard for Test for Surface Burning Characteristics of Building Materials

1887-2017.....Standard for Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics

H. 3E Plus® version 4.1 Insulation Thickness Computer Program: Available from NAIMA with free download; http://www.pipeinsulation.net

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 07 11, PLUMBING INSULATION", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

D. Shop Drawings:

1. All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM Designation, Federal and Military specifications.
   a. Insulation materials: Specify each type used and state surface burning characteristics.
   b. Insulation facings and jackets: Each type used and state surface burning characteristics.
   c. Insulation accessory materials: Each type used.
   d. Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation shall follow the guidelines in accordance with ASTM C1710.
   e. Make reference to applicable specification paragraph numbers for coordination.
   f. All insulation fittings (exception flexible unicellular insulation) shall be fabricated in accordance with ASTM C450 and the referenced Adjunct to ASTM C450.

1.5 QUALITY ASSURANCE

A. Refer to article QUALITY ASSURANCE, in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

B. Criteria:

1. Comply with NFPA 90A, particularly paragraphs 4.3.3.1 through 4.3.3.6, 4.3.11.2.6, parts of which are quoted as follows:

   4.3.3.1 Pipe and duct insulation and coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and

supplementary materials added to air ducts, plenums, panels and duct silencers used in duct systems shall have, in the form in which they are used, a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with ASTM E84 and appropriate mounting practice, e.g. ASTM E2231.

4.3.3.3 Coverings and linings for air ducts, pipes, plenums and panels including all pipe and duct insulation materials shall not flame, glow, smolder, or smoke when tested in accordance with a similar test for pipe covering, ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation, at the temperature to which they are exposed in service. In no case shall the test temperature be below 121 degrees C (250 degrees F).

4.3.11.2.6.3 Nonferrous fire sprinkler piping shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with UL 1887, Standard for Safety Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.

4.3.11.2.6.8 Smoke detectors shall not be required to meet the provisions of Section 4.3.

2. Test methods: ASTM E84, UL 723, and ASTM E2231.
3. Specified k factors are at 24 degrees C (75 degrees F) mean temperature unless stated otherwise. Where optional thermal insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.
4. All materials shall be compatible and suitable for service temperature and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.

C. Every package or standard container of insulation or accessories delivered to the job site for use shall have a manufacturer's stamp or label giving the name of the manufacturer, description of the material, and the production date or code.

1.6 AS-BUILT DOCUMENTATION

A. Submit manufacturer’s literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be in

electronic version on compact disc or DVD inserted into a three- ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them in Auto-CAD version 2016 provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and certification that all results of tests were within limits specified.

1.7 STORAGE AND HANDLING OF MATERIAL

A. Store materials in clean and dry environment, pipe insulation jackets shall be clean and unmarred. Place adhesives in original containers. Maintain ambient temperatures and conditions as required by printed instructions of manufacturers of adhesives, mastics and finishing cements.

PART 2 - PRODUCTS

2.1 MINERAL FIBER OR FIBER GLASS

A. ASTM C612 (Board, Block), Class 1 or 2, density 48 kg/m^3 (nominal 3 pcf), k = 0.037 (.26) at 24 degrees C (75 degrees F), external insulation for temperatures up to 204 degrees C (400 degrees F).

B. ASTM C553 (Blanket, Flexible) Type I, Class B-3, Density 16 kg/m^3 (nominal 1 pcf), k = 0.045 (0.31) at 24 degrees C (75 degrees F), for use at temperatures up to 204 degrees C (400 degrees F).

C. ASTM C547 (Pipe Fitting Insulation and Preformed Pipe Insulation), Class 1, k = 0.037 (0.26) at 24 degrees C (75 degrees F), for use at temperatures up to 230 degrees C (446 degrees F) with an all service vapor retarder jacket (ASJ) and with polyvinyl chloride (PVC) pre-molded fitting covering.

2.2 MINERAL WOOL OR REFRACTORY FIBER

A. Comply with Standard ASTM C612, Class 3, 450 degrees C (842 degrees F).

2.3 RIGID CELLULAR PHENOLIC FOAM

A. Preformed (molded) pipe insulation, ASTM C1126, Type III, grade 1, k = 0.021(0.15) at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with vapor retarder and all service vapor retarder jacket (ASJ) and with PVC pre-molded fitting covering.

B. Equipment Insulation, ASTM C1126, Type II, grade 1, k = 0.021 (0.15) at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with rigid cellular phenolic insulation and covering, and all service vapor retarder jacket (ASJ).

2.4 CELLULAR GLASS CLOSED-CELL

A. Comply with Standard ASTM C552, density 120 kg/m^3 (7.5 pcf) nominal, k = 0.033 (0.29) at 24 degrees C (75 degrees F).

B. Pipe insulation for use at process temperatures below ambient air to 482 degrees C (900 degrees F) with or without all service vapor retarder jacket (ASJ).

C. Pipe insulation for use at process temperatures for pipe and tube below ambient air temperatures or where condensation control is necessary are to be installed with a vapor retarder/barrier system of with or without all service vapor retarder sealed jacket (ASJ) system. Without ASJ shall require all longitudinal and circumferential joints to be vapor sealed with vapor barrier mastic.

D. Cellular glass thermal insulation intended for use on surfaces operating at temperatures between –268 and 482 degrees C (–450 and 900 degrees F). It is possible that special fabrication or techniques for pipe insulation, or both, shall be required for application in the temperature range from 121 to 427 degrees C (250 to 800 degrees F).

2.5 POLYISOCYANURATE CLOSED-CELL RIGID

A. Preformed (fabricated) pipe insulation, ASTM C591, Type IV, K=0.027(0.19) at 24 degrees C (75 degrees F), flame spread not over 25, smoke developed not over 50, for use at temperatures up to 149 degree C (300 degree F) with factory applied PVDC or all service vapor retarder jacket with PVC pre-molded fitting covers.

B. Equipment and duct insulation, ASTM C591, Type IV, K=0.027(0.19) at 24 degrees C (75 degrees F), for use at temperatures up to 149 degrees C (300 degrees F) with PVDC or all service jacket vapor retarder jacket.

2.6 FLEXIBLE ELASTOMERIC CELLULAR THERMAL

A. ASTM C534/C534M, k = 0.039 (0.27) at 24 degrees C (75 degrees F), flame spread not over 25, smoke developed not over 50, for temperatures from minus 4 degrees C (40 degrees F) to 93 degrees C (199 degrees F). Under high humidity exposures for condensation control an external vapor retarder/barrier jacket is required. Consult ASTM C1710.

2.7 CALCIUM SILICATE – (NOT USED)

2.8 INSULATION FACINGS AND JACKETS

A. Vapor Retarder, higher strength with low water permeance = 0.02 or less perm rating, Beach puncture 50 units for insulation facing on pipe insulation jackets. Facings and jackets shall be ASJ or PVDC Vapor Retarder jacketing.

B. ASJ shall be white finish (kraft paper) bonded to 0.025 mm (1 mil) thick aluminum foil, fiberglass reinforced, with pressure sensitive adhesive closure. Comply with ASTM C1136. Beach puncture is 50 units, suitable for painting without sizing. Jackets shall have minimum 40 mm (1-1/2 inch) lap on longitudinal joints and minimum 75 mm (3 inch) butt strip on end joints. Butt strip material shall be same as the jacket. Lap and butt strips shall be self-sealing type with factory-applied pressure sensitive adhesive.

C. Vapor Retarder medium strength with low water vapor permeance of 0.02 or less perm rating), Beach puncture 25 units: FSK or PVDC type for concealed ductwork and equipment.

D. Except for flexible elastomeric cellular thermal insulation (not for high humidity exposures), field applied vapor barrier jackets shall be provided, in addition to the specified facings and jackets, on all exterior piping as well as on interior piping exposed to outdoor air (i.e.; in ventilated attics, piping in ventilated (not air conditioned)

spaces, etc.)in high humidity locations and/or conveying fluids below ambient temperature. The vapor barrier jacket shall consist of a multi-layer laminated cladding with a maximum water vapor permeance of 0.001 perms. The minimum puncture resistance shall be 35 cm-kg (30 inch-pounds) for interior locations and 92 cm-kg (80 inch-pounds) for exterior or exposed locations or where the insulation is subject to damage.

E. Except for cellular glass thermal insulation, when all longitudinal and circumferential joints are vapor sealed with a vapor barrier mastic or caulking, vapor barrier jackets may not be provided. For aesthetic and physical abuse applications, exterior jacketing is recommended. Otherwise field applied vapor barrier jackets shall be provided, in addition to the applicable specified facings and jackets, on all exterior piping as well as on interior piping exposed to outdoor air (i.e.; in ventilated attics, piping in ventilated (not air conditioned) spaces, etc.) in high humidity locations and/or conveying fluids below ambient temperature. The vapor barrier jacket shall consist of a multi-layer laminated cladding with a maximum water vapor permeance of 0.001 perms. The minimum puncture resistance shall be 35 cm-kg (30 inch-pounds) for interior locations and 92 cm-kg (80 inch-pounds) for exterior or exposed locations or where the insulation is subject to damage.

F. Pipe fitting insulation covering (jackets): Fitting covering shall be pre-molded to match shape of fitting and shall be PVC conforming to Fed Spec L-P-535E, composition A, Type II Grade GU, and Type III, minimum thickness 0.7 mm (0.03 inches). Provide color matching vapor retarder pressure sensitive tape. Staples, tacks, or any other attachment that penetrates the PVC covering is not allowed on any form of a vapor barrier system in below ambient process temperature applications.

2.9 PIPE COVERING PROTECTION SADDLES

A. Cold pipe support: Pre-molded pipe insulation 180 degrees (half-shells) on bottom half of pipe at supports. Material shall be cellular glass or high density Polyisocyanurate insulation of the same thickness as adjacent insulation. Density of Polyisocyanurate insulation shall be a minimum of 48 kg/m^3 (3.0 pcf).

Nominal Pipe Size and Accessories Material (Insert Blocks)	
Nominal Pipe Size mm (inches)	**Insert Blocks mm (inches)**
Up through 125 (5)	150 (6) long

2.10 ADHESIVE, MASTIC, CEMENT

A. Mil. Spec. MIL-A-3316, Class 1: Jacket and lap adhesive and protective finish coating for insulation.

B. Mil. Spec. MIL-A-3316, Class 2: Adhesive for laps and for adhering insulation to metal surfaces.

C. Mil. Spec. MIL-A-24179A, Type II Class 1: Adhesive for installing flexible unicellular insulation and for laps and general use.

D. Mil. Spec. MIL-PRF-19565C, Type I: Protective finish for outdoor use.

E. Mil. Spec. MIL-PRFC-19565C, Type I or Type II: Vapor barrier compound for indoor use.

F. ASTM C449: Mineral fiber hydraulic-setting thermal insulating and finishing cement.

G. Other: Insulation manufacturers' published recommendations.

2.11 MECHANICAL FASTENERS

A. Pins, anchors: Welded pins, or metal or nylon anchors with galvanized steel or fiber washer, or clips. Pin diameter shall be as recommended by the insulation manufacturer.

B. Staples: Outward clinching galvanized steel. Staples are not allowed for below ambient vapor barrier applications.

C. Bands: 13 mm (1/2 inch) nominal width, brass, galvanized steel, aluminum or stainless steel.

D. Tacks, rivets, screws or any other attachment device capable of penetrating the vapor retarder shall NOT be used to attach/close the any type of vapor retarder jacketing. Thumb tacks sometimes used on PVC jacketing and preformed fitting covers closures are not allowed for below ambient vapor barrier applications.

2.12 REINFORCEMENT AND FINISHES

A. Glass fabric, open weave: ASTM D1668/D1668M, Type III (resin treated) and Type I (asphalt or white resin treated).

B. Glass fiber fitting tape: Mil. Spec MIL-C-20079H, Type II, Class 1.

C. Tape for Flexible Elastomeric Cellular Insulation: As recommended by the insulation manufacturer.

D. Corner beads: 50 mm (2 inch) by 50 mm (2 inch), 0.55 mm thick (26 gage) galvanized steel; or, 25 mm (1 inch) by 25 mm (1 inch), 0.47 mm thick (28 gage) aluminum angle adhered to 50 mm (2 inch) by 50 mm (2 inch) Kraft paper.

E. PVC fitting cover: Fed. Spec L-P-535E, Composition A, 11-86 Type II, Grade GU, with Form B Mineral Fiber insert, for media temperature 10 to 121 degrees C (50 to 250 degrees F). Below 10 degrees C (50 degrees F) and above 121 degrees C (250 degrees F) provide mitered pipe insulation of the same type as insulating straight pipe. Provide double layer insert. Provide vapor barrier pressure sensitive tape matching the color of the PVC jacket.

2.13 FIRESTOPPING MATERIAL

A. Other than pipe insulation, refer to Section 07 84 00, FIRESTOPPING.

2.14 FLAME AND SMOKE

A. Unless shown otherwise all assembled systems shall meet flame spread 25 and smoke developed 50 rating as developed under ASTM and UL standards and specifications. See paragraph "Quality Assurance."

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Required pressure tests of piping joints and connections shall be completed and the work approved by the Contracting Officer’s Representative (COR) for application of insulation. Surface shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.

B. Except for specific exceptions or as noted, insulate all specified equipment, and piping (pipe, fittings, valves, accessories). Insulate each pipe individually. Do not use scrap pieces of insulation where a full length section will fit.

C. Where removal of insulation of piping and equipment is required to comply with Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT, such areas shall be reinsulated to comply with this specification.

D. Insulation materials shall be installed with smooth and even surfaces, with jackets and facings drawn tight and smoothly cemented down and

sealed at all laps. Insulation shall be continuous through all sleeves and openings, except at fire dampers and duct heaters (NFPA 90A).

E. Vapor retarders shall be continuous and uninterrupted throughout systems with operating temperature 15 degrees C (60 degrees F) and below. Lap and seal vapor barrier over ends and exposed edges of insulation. Anchors, supports and other metal projections through insulation on cold surfaces shall be insulated and vapor sealed for a minimum length of 150 mm (6 inches).

F. Install vapor stops with operating temperature 15 degrees C (60 degrees F) and below at all insulation terminations on either side of valves, pumps, fittings, and equipment and particularly in straight lengths every 4.6 to 6.1 meters (approx. 15 to 20 feet) of pipe insulation. The annular space between the pipe and pipe insulation of approx. 25 mm (1 inch) in length at every vapor stop shall be sealed with appropriate vapor barrier sealant. Bio-based materials shall be utilized when possible.

G. Construct insulation on parts of equipment such as cold water pumps and heat exchangers that must be opened periodically for maintenance or repair, so insulation can be removed and replaced without damage. Install insulation with bolted 1 mm thick (20 gage) galvanized steel or aluminum covers as complete units, or in sections, with all necessary supports, and split to coincide with flange/split of the equipment. Do not insulate over equipment nameplate data.

H. Insulation on hot piping and equipment shall be terminated square at items not to be insulated, access openings and nameplates. Cover all exposed raw insulation with white sealer coating (caution about coating’s maximum temperature limit) or jacket material.

I. Protect all insulations outside of buildings with aluminum jacket using lock joint or other approved system for a continuous weather tight system. Access doors and other items requiring maintenance or access shall be removable and sealable.

J. Plumbing work not to be insulated unless otherwise noted:
   1. Piping and valves of fire protection system.
   2. Chromium plated brass piping.
   3. Water piping in contact with earth.
   4. Distilled water piping.

K. Apply insulation materials subject to the manufacturer's recommended temperature limits. Apply adhesives, mastic and coatings at the manufacturer's recommended minimum wet or dry film thickness. Bio-based materials shall be utilized when possible.

L. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. Use of polyurethane or polyisocyanurate spray-foam to fill a PVC elbow jacket is prohibited on cold applications.

M. Firestop Pipe insulation:

1. Provide firestopping insulation at fire and smoke barriers through penetrations. Firestopping insulation shall be UL listed as defined in Section 07 84 00, FIRESTOPPING.
2. Pipe penetrations requiring fire stop insulation including, but not limited to the following:
   a. Pipe risers through floors
   b. Pipe chase walls and floors
   c. Smoke partitions
   d. Fire partitions
   e. Hourly rated walls

N. Provide vapor barrier systems as follows:

1. All piping exposed to outdoor weather.
2. All interior piping conveying fluids exposed to outdoor air (i.e. in attics, ventilated (not air conditioned) spaces, etc.) and/or below ambient air temperature and in high humidity locations.

O. Provide metal jackets over insulation as follows:

1. All plumbing piping exposed to outdoor weather.
2. Piping exposed in building, within 1829 mm (6 feet) of the floor, that connects to sterilizers, kitchen and laundry equipment. Jackets may be applied with pop rivets except for cold pipe or tubing applications. Provide aluminum angle ring escutcheons at wall, ceiling or floor penetrations.
3. A 50 mm (2 inch) jacket overlap is required at longitudinal and circumferential joints with the overlap at the bottom.

P. Provide PVC jackets over insulation as follows:

1. Piping exposed in building, within 1829 mm (6 feet) of the floor, on piping that is not precluded in previous sections.

2. A 50 mm (2 inch) jacket overlap is required at longitudinal and circumferential joints with the overlap at the bottom.

3.2 INSULATION INSTALLATION

A. Molded Mineral Fiber Pipe and Tubing Covering:

1. Fit insulation to pipe, aligning all longitudinal joints. Seal longitudinal joint laps and circumferential butt strips by rubbing hard with a nylon sealing tool to assure a positive seal. Staples may be used to assist in securing insulation except for cold piping. Seal all vapor retarder penetrations on cold piping with a generous application of vapor barrier mastic. Provide cellar glass inserts and install with metal insulation shields at outside pipe supports. Install freeze protection insulation over heating cable.
2. Contractor's options for fitting, flange and valve insulation:
   a. Insulating and finishing cement for sizes less than 100 mm (4 inches) operating at surface temperature of 15 degrees C (60 degrees F) or more.
   b. Factory pre-molded, one-piece PVC covers with mineral fiber, (Form B), inserts surface temperature of above 4 degrees C (40 degrees F) to 121 degrees C (250 degrees F). Provide mitered preformed insulation of the same type as the installed straight pipe insulation for pipe temperatures below 4 degrees C (40 degrees F). Secure first layer of mineral fiber insulation with twine. Seal seam edges with vapor barrier mastic and secure with fitting tape.
   c. Factory preformed, ASTM C547 or fabricated mitered sections, joined with adhesive or (hot only) wired in place. (Bio-based materials shall be utilized when possible.) For hot piping finish with a smoothing coat of finishing cement. For cold fittings, 15 degrees C (60 degrees F) or less, vapor seal with a layer of glass fitting tape imbedded between two 2 mm (1/16 inch) coats of vapor barrier mastic.
   d. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 50 mm (2 inches).
3. Nominal thickness in millimeters and inches specified in the schedule at the end of this section.

B. Polyisocyanurate Closed-Cell Rigid Insulation:

1. Polyisocyanurate closed-cell rigid insulation (PIR) may be provided for exterior piping and equipment for temperature up to 149 degree C (300 degree F).
2. Install insulation, vapor retarder and jacketing per manufacturer's recommendations. Particular attention should be paid to recommendations for joint staggering, adhesive application, external hanger design, expansion/contraction joint design and spacing and vapor retarder integrity.
3. Install insulation with all joints tightly butted (except expansion) joints in hot applications). Provide insulation contractions joints for very cold process temperatures.
4. If insulation thickness exceeds 65 mm (2-1/2 inches), install as a double layer system with longitudinal (lap) and butt joint staggering as recommended by manufacturer.
5. For cold applications, vapor retarder shall be installed in a continuous manner. No staples, rivets, screws or any other attachment device capable of penetrating the vapor retarder shall be used to attach the vapor retarder or jacketing. No wire ties capable of penetrating the vapor retarder shall be used to hold the insulation in place. Stainless steel banding shall be used for cold applications to attach PVC or metal jacketing.
6. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. The elbow/ fitting insulation shall be field-fabricated, mitered or factory prefabricated to the necessary size and shape to fit on the elbow/ fitting. Use of polyurethane or polyisocyanurate spray-foam to fill PVC elbow jacket is prohibited on cold applications.
7. For cold applications, the vapor retarder on elbows/fittings shall be either mastic-fabric-mastic or 2 mil thick PVDC vapor retarder adhesive tape. Bio-based materials shall be utilized when possible.
8. All PVC and metal jacketing shall be installed so as to naturally shed water. Joints shall point down and shall be sealed with either adhesive or caulking (except for periodic slip joints). Bio-based materials shall be utilized when possible.

9. Note the NFPA 90A burning characteristic requirements of 25/50 in paragraph "Quality Assurance". Refer to paragraph "General Requirements" for items not to be insulated.
10. Minimum thickness in millimeter (inches) specified in the schedule at the end of this section.

C. Flexible Elastomeric Cellular Thermal Insulation:

1. Apply insulation and fabricate fittings in accordance with the manufacturer's installation instructions and finish with two coats of weather resistant finish as recommended by the insulation manufacturer. External vapor barrier jacketing may be required for expected or anticipated high humidity exposures. See ASTM C1710.
2. Pipe and tubing insulation:
   a. Use proper size material. Do not stretch or strain insulation.
   b. To avoid undue compression of insulation, use supports as recommended by the elastomeric insulation manufacturer. Insulation shields are specified under Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
   c. Where possible, slip insulation over the pipe or tubing prior to connection, and seal the butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and apply it to the pipe sealing the seam and joints with contact adhesive. Optional tape sealing, as recommended by the manufacturer, may be employed. Bio-based materials shall be utilized when possible.
3. Apply sheet insulation to flat or large curved surfaces with 100 percent adhesive coverage. For fittings and large pipe, apply adhesive to seams only.
4. Pipe insulation: nominal thickness in millimeters (inches as specified in the schedule at the end of this section.

3.4 PIPE INSULATION SCHEDULE

A. Provide insulation for piping systems as scheduled below:

Insulation Thickness Millimeters (Inches)					
		Nominal Pipe Size Millimeters (Inches)			
Operating Temperature Range/Service	**Insulation Material**	**Less than 25 (1)**	**25 – 32 (1 – 1¼)**	**38 – 75 (1½ - 3)**	**100 (4) and Greater**
4-15 degrees C (40-60 degrees F)	Rigid Cellular Phenolic Foam (Above ground piping only)	25 (1.0)	25(1.0)	25 (1.0)	25 (1.0)

(Domestic cold water piping)	(exterior locations only)				
4-15 degrees C (40-60 degrees F) (Domestic cold water piping)	Polyiso-cyanurate Closed-Cell Rigid(Exterior Locations only)	25 (1.0)	25(1.0)	25 (1.0)	25 (1.0)
(4-15 degrees C (40-60 degrees F) (Domestic cold water piping)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	25 (1.0)	25(1.0)	25 (1.0)	25 (1.0)
4-15 degrees C (40-60 degrees F) (Domestic cold water piping)	Cellular Glass Thermal	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)

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SECTION 22 14 29
SUMP PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Sump pumps. See schedule on Drawings for pump capacity and head.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic Restraint.

D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

E. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.

F. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standard Institute (ANSI)/Hydraulic Institute (HI):

1.1-1.2-2014 2014.....Rotodynamic Centrifugal Pumps for Nomenclature and Definitions

1.3-2013.....Rotodynamic Centrifugal Pumps for Design and Application

1.4-2014.....Rotodynamic Centrifugal Pumps for Manuals Describing Installation, Operation, and Maintenance

C. ASTM International (ASTM):

A48/A48M-2003 (R2012)...Standard Specification for Gray Iron Castings

A532/A532M-2010 (R2014).Standard Specification for Abrasion-Resistant Cast Irons

B584-2014.....Standard Specification for Copper Alloy Sand Castings for General Applications

D. National Electrical Manufacturers Association (NEMA):

ICS 6-1993 (R2001, R2006) Industrial Control and Systems: Enclosures

250-2014.....Enclosures for Electrical Equipment (1000 Volts Maximum)

E. Underwriters' Laboratories, Inc. (UL):

508-1999 (R2013).....Standards for Industrial Control Equipment

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 14 29, SUMP PUMPS", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. Pump:
   a. Manufacturer and model.
   b. Operating speed (rpm).
   c. Capacity.
   d. Characteristic performance curves.
2. Electric Motor:
   a. Manufacturer, frame and type.
   b. Speed.
   c. Current Characteristics and HP (W).
   d. Efficiency.
3. Control panel.
4. Sensors.

D. Certified copies of all the factory and construction site test data sheets and reports.

E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replacement parts:

1. Include complete list which indicates all components of the system.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance, and troubleshooting.

1.5 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be

inserted into a three-ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them in Auto-CADD version 2016 provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

D. Certification documentation shall be provided to COR 10 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified

PART 2 - PRODUCTS

2.1 SUMP PUMP

A. Centrifugal, vertical, submersible pump and motor, designed for 130 degrees F maximum water service. Driver shall be electric motor. Support shall be rigid type. Provide perforated, suction strainer. Systems shall include one, two, or more pumps with alternator as required by: Contract Documents. Pumps shall be capable of continuous duty cycle

1. Pump housings shall be cast iron, bronze, aluminum, plastic or stainless steel. Cast iron and aluminum housings for submersible pumps shall be epoxy coated.

B. Impeller: Bonze.

C. Shaft: Stainless steel or other approved corrosion-resisting metal.

D. Bearings: As required to hold shaft alignment, anti-friction type for thrust permanently lubricated.

E. Seal: Mechanical.

F. Motor: Maximum 104 degrees F (40 degrees C) ambient temperature rise above the maximum fluid temperature being pumped [, drip-proof] [, completely enclosed], voltage and phase as shown in schedule on Electrical drawings conforming to NEMA 250[-Type 4][-Type 6P]. Size the motor capacity to operate pump without overloading the motor at any point on the pump curve. Refer to Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.

G. Automatic Control and Level Alarm: Furnish a control panel in a NEMA 1 enclosure for indoors or in a NEMA 4X enclosure for outdoors. The controls shall be suitable for operation with the electrical characteristics listed on the Electrical drawings. The control panel shall have a level control system with switches to start and stop pumps automatically, and to activate a high-water alarm. The level control system shall include sensors in the sump that detect the level of the liquid. The pump is also connected to a control which has the ability to prevent oil from being pumped. The same unit shall activate an alarm when oil is detected. The sensors may be float type switches, ultrasonic level sensors, or transducers. The high-water alarm shall have a red beacon light at the control panel and a buzzer, horn, or bell. The alarm shall have a silencing switch. Provide auxiliary contacts for remote communication with, and alarm monitoring to, the BAS using a BACnet compatible open-protocol type interface to DDC Controls System.

1. The circuitry of the control panel shall include:
   a. Power switch to turn on/off the automatic control mechanism
   b. HOA switches to manually override automatic control mechanism
   c. Run lights to indicate when pumps are powered up
   d. Level status lights to indicate when water in sump has reached the predetermined on/off and alarm levels
   e. Magnetic motor contactors
   f. Disconnect/breaker for each pump
   g. Automatic motor overload protection

h. Wiring terminal block
i. Dead front
j. Auxiliary contacts
k. Control circuit protection
l. Fused control step down transformer

2. Sensors that detect the level of water in the sump shall be so arranged as to allow the accumulation of enough volume of liquid below the normal on-level that the pump will run for a minimum cycle time as recommended by the pump manufacturer. Sensors shall be located to activate the alarm adequately before the water level rises to the inlet pipe.
3. Provide two separate power supplies to the control panel, one for the control/alarm circuitry and one for power to the pump motors. Each power supply is to be fed from its own breaker so that if a pump overload trips a breaker, the alarm system shall still function. Each power supply is to be wired in its own conduit.
4. Wiring from the sump to the control panel shall have separate conduits for the pump power and for the sensor switches. All conduits are to be sealed at the basin and at the control panel to prevent the intrusion of moisture and of flammable and/or corrosive gases.

H. Sump: Furnish cast iron, fiberglass, steel, or polyethylene basin with gas tight covers. Cover shall be 24” diameter(275 by 381 mm) manhole with bolted cover, vent connection, openings for pumps and controls. Sump shall be sized to allow an adequate volume of water to accumulate for a minimum one- minute cycle of pump operation.

I. Provide a check and ball valve in the discharge of each pump. Refer to Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING.

J. Removal/Disconnect System: In a system utilizing a submersible pump, where sump depth, pump size, or other conditions make removal of the pump unusually difficult or unsafe, a manufacturer’s removal/disconnect system shall be provided. The system shall consist of a discharge fitting mounted on vertical guide rails attached to the sump or quick connect pipe fitting connection to piping. The pump shall be fitted with an adapter fitting that easily connects to/disconnects from the discharge fitting as the pump is raised from or lowered into the sump. The discharge piping shall connect to the discharge fitting so that it

is disconnected without workers entering the pit. Where the sump depth is greater than five feet or other conditions exist to make the removal of the pump difficult or hazardous, the system shall include a rail guided quick disconnect apparatus to allow the pump to be pulled up out of the sump.

PART 3 - EXECUTION

3.1 STARTUP AND TESTING

A. Pump installation to comply with ANSI/HI 1.4 for sump pumps.

B. Leak Test: Charge piping system and test for leaks. Test until there are no leaks. Make tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

C. The tests shall include system capacity and all control and alarm functions.

D. When any defects are detected, correct defects and repeat test.

E. [The CxA will observe startup and contractor testing of selected equipment.] Coordinate the startup and contractor testing schedules with the COR [and CxA]. Contractor shall provide a minimum of 10 working days prior to startup and testing.

3.2 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for four hours to instruct VA Personnel in operation and maintenance of units.

---END---

SECTION 23 05 11
COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 23.

B. Definitions:

1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms.
2. Exterior: Piping, ductwork, and equipment exposed to weather be it temperature, humidity, precipitation, wind, or solar radiation.

C. Abbreviations/Acronyms:

1. ac: Alternating Current
2. AC: Air Conditioning
3. ACU: Air Conditioning Unit
4. ACR: Air Conditioning and Refrigeration
5. AI: Analog Input
6. AISI: American Iron and Steel Institute
7. AO: Analog Output
8. ASJ: All Service Jacket
9. AWG: American Wire Gauge
10. BACnet: Building Automation and Control Networking Protocol
11. BAS: Building Automation System
12. bhp: Brake Horsepower
13. Btu: British Thermal Unit
14. Btu/h: British Thermal Unit Per Hour
15. C: Celsius
16. CD: Compact Disk
17. CFM: Cubic Foot Per Minute
18. CHS: Chilled Water Supply
19. CHR: Chilled Water Return
20. CLR: Color
21. CO: Carbon Monoxide
22. COR: Contracting Officer’s Representative
23. CPVC: Chlorinated Polyvinyl Chloride
24. CRS: Corrosion Resistant Steel
25. CW: Cold Water
26. CxA: Commissioning Agent
27. dB: Decibels

28. dB(A): Decibels (A weighted)
29. DDC: Direct Digital Control
30. DI: Digital Input
31. DO: Digital Output
32. DVD: Digital Video Disc
33. DN: Diameter Nominal
34. DWV: Drainage, Waste and Vent
35. EPDM: Ethylene Propylene Diene Monomer
36. F: Fahrenheit
37. FD: Floor Drain
38. FED: Federal
39. FG: Fiberglass
40. FSK: Foil-Scrim-Kraft facing
41. gpm: Gallons Per Minute
42. HDPE: High Density Polyethylene
43. Hg: Mercury
44. HOA: Hands-Off-Automatic
45. hp: Horsepower
46. HW: Hot Water
47. Hz: Hertz
48. ID: Inside Diameter
49. IPS: Iron Pipe Size
50. kg: Kilogram
51. kPa: Kilopascal
52. lb: Pound
53. lb/hr: Pounds Per Hour
54. L/s: Liters Per Second
55. L/min: Liters Per Minute
56. MAX: Maximum
57. MBtu/h: 1000 Btu/h
58. MBtu: 1000 Btu
59. m: Meter
60. MFG: Manufacturer
61. MIN: Minimum
62. ml: Milliliter
63. mm: Millimeter
64. MW: Megawatt

65. NC: Normally Closed
66. NO: Normally Open
67. NPT: National Pipe Thread
68. NPS: Nominal Pipe Size
69. OD: Outside Diameter
70. OSD: Open Sight Drain
71. PID: Proportional-Integral-Differential
72. PLC: Programmable Logic Controllers
73. PP: Polypropylene
74. PPE: Personal Protection Equipment
75. PRV: Pressure Reducing Valve
76. PSIA: Pounds Per Square Inch Absolute
77. psig: Pounds Per Square Inch Gauge
78. PTFE: Polytetrafluoroethylene
79. PVC: Polyvinyl Chloride
80. RH: Relative Humidity
81. RPM: Revolutions Per Minute
82. RS: Refrigerant Suction
83. RTD: Resistance Temperature Detectors
84. SCFM: Standard Cubic Feet Per Minute
85. SPEC: Specification
86. SPS: Sterile Processing Services
87. STD: Standard
88. SDR: Standard Dimension Ratio
89. TAB: Testing, Adjusting, and Balancing
90. TDH: Total Dynamic Head
91. TEFC: Totally Enclosed Fan-Cooled
92. TFE: Tetrafluoroethylene
93. THERM: 100,000 Btu
94. THHN: Thermoplastic High-Heat Resistant Nylon Coated Wire
95. THWN: Thermoplastic Heat & Water-Resistant Nylon Coated Wire
96. T/P: Temperature and Pressure
97. V: Volt
98. VAC: Vacuum
99. VA: Veterans Administration
100. VAC: Voltage in Alternating Current
101. VA CFM: VA Construction & Facilities Management

102. VA CFM CSS: VA Construction & Facilities Management, Consulting Support Service
103. VAMC: Veterans Administration Medical Center
104. VHA OCAMES: Veterans Health Administration – Office of Capital Asset Management Engineering and Support
105. WCB: Wrought Carbon Steel, Grade B
106. WG: Water Gauge or Water Column

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
C. Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT.
D. Section 05 50 00, METAL FABRICATIONS.
E. Section 07 84 00, FIRESTOPPING.
F. Section 07 92 00, JOINT SEALANTS.
G. Section 09 91 00, PAINTING.
H. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION.
I. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.
J. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.
K. Section 23 07 11, HVAC AND BOILER PLANT INSULATION.
L. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
M. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
N. Section 23 36 00, AIR TERMINAL UNITS.
O. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
P. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
Q. Section 26 29 11, MOTOR CONTROLLERS.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standard will govern.
B. Air Movement and Control Association (AMCA):
410-1996.....Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans
C. American Society of Mechanical Engineers (ASME):
B31.1-2018.....Power Piping

B31.9-2017.....Building Services Piping

ASME Boiler and Pressure Vessel Code:

BPVC Section IX-2019 Welding, Brazing, and Fusing Qualifications

D. American Society for Testing and Materials (ASTM):

A36/A36M-2019.....Standard Specification for Carbon Structural Steel

A575-1996(R2018).....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

E. Association for Rubber Products Manufacturers (ARPM):

IP-20-2015.....Specifications for Drives Using Classical V-Belts and Sheaves

IP-21-2016.....Specifications for Drives Using Double-V (Hexagonal) Belts

IP-24-2016.....Specifications for Drives Using Synchronous Belts

IP-27-2015.....Specifications for Drives Using Curvilinear Toothed Synchronous Belts

F. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc.:

SP-58-2018.....Pipe Hangers and Supports-Materials, Design, Manufacture, Selection, Application, and Installation

SP-127-2014a.....Bracing for Piping Systems: Seismic-Wind-Dynamic Design, Selection, and Application

G. Military Specifications (MIL):

MIL-P-21035B-2013.....Paint High Zinc Dust Content, Galvanizing Repair (Metric)

H. National Fire Protection Association (NFPA):

70-2020.....National Electrical Code (NEC)

101-2018.....Life Safety Code

I. Department of Veterans Affairs (VA):

PG-18-10-2018.....Physical Security and Resiliency Design Manual

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 05 11, COMMON WORK RESULTS FOR HVAC", with applicable paragraph identification.

C. If the project is phased, submit complete phasing plan/schedule with manpower levels prior to commencing work. The phasing plan shall be detailed enough to provide milestones in the process that can be verified.

D. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements, and all equipment that requires regular maintenance, calibration, etc are accessable from the floor or permanent work platform. It is the Contractor's responsibility to ensure all submittals meet the VA specifications and requirements and it is assumed by the VA that all submittals do meet the VA specifications unless the Contractor has requested a variance in writing and approved by COR prior to the submittal. If at any time during the project it is found that any item does not meet the VA specifications and there was no variance approval the Contractor shall correct at no additional cost or time to the Government even if a submittal was approved.

E. If equipment is submitted which differs in arrangement from that shown, provide documentation proving equivalent performance, design standards and drawings that show the rearrangement of all associated systems. Additionally, any impacts on ancillary equipment or services such as foundations, piping, and electrical shall be the Contractor's responsibility to design, supply, and install at no additional cost or time to the Government. VA approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

F. Prior to submitting shop drawings for approval, Contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed contract documents and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.

G. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together.

Coordinate and properly integrate materials and equipment to provide a completely compatible and efficient installation.

H. Coordination/Shop Drawings:

1. Submit complete consolidated and coordinated shop drawings for all new systems, and for existing systems that are in the same areas.
2. The coordination/shop drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8-inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show locations and adequate clearance for all equipment, piping, valves, control panels and other items. Show the access means for all items requiring access for operations and maintenance. Provide detailed coordination/shop drawings of all piping and duct systems. The drawings should include all lockout/tagout points for all energy/hazard sources for each piece of equipment. Coordinate lockout/tagout procedures and practices with local VA requirements.
3. Do not install equipment foundations, equipment or piping until coordination/shop drawings have been approved.
4. In addition, for HVAC systems, provide details of the following:
   a. Mechanical equipment rooms.
   b. Interstitial space.
   c. Hangers, inserts, supports, and bracing.
   d. Pipe sleeves.
   e. Duct or equipment penetrations of floors, walls, ceilings, or roofs.

I. Manufacturer's Literature and Data: Include full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity. Submit under the pertinent section rather than under this section.

1. Submit belt drive with the driven equipment. Submit selection data for specific drives when requested by the COR.
2. Submit electric motor data and variable speed drive data with the driven equipment.
3. Equipment and materials identification.
4. Fire-stopping materials.

5. Hangers, inserts, supports and bracing. Provide complete stress analysis for variable spring and constant support hangers.
6. Wall, floor, and ceiling plates.

J. Rigging Plan: Provide documentation of the capacity and weight of the rigging and equipment intended to be used. The plan shall include the path of travel of the load, the staging area and intended access, and qualifications of the operator and signal person.

K. HVAC Maintenance Data and Operating Instructions:

1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment.
2. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:
   a. Include complete list indicating all components of the systems.
   b. Include complete diagrams of the internal wiring for each item of equipment.
   c. Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.
3. Provide a listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment. Include in the listing belts for equipment: Belt manufacturer, model number, size, and style, and distinguished whether of multiple belt sets.

L. Provide copies of approved HVAC equipment submittals to the TAB and Commissioning Subcontractor.

M. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the Contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

N. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

1.5 QUALITY ASSURANCE

A. Mechanical, electrical, and associated systems shall be safe, reliable, efficient, durable, easily, and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified. The systems shall be comprised of high quality

institutional-class and industrial-class products of manufacturers that are experienced specialists in the required product lines. All construction firms and personnel shall be experienced and qualified specialists in industrial and institutional HVAC.

B. Flow Rate Tolerance for HVAC Equipment: Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.

C. Equipment Vibration Tolerance:

1. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT. Equipment shall be factory-balanced to this tolerance and re-balanced on site, as necessary.
2. After HVAC air balance work is completed and permanent drive sheaves are in place, perform field mechanical balancing and adjustments required to meet the specified vibration tolerance.

D. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years (or longer as specified elsewhere). The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years. However, digital electronics devices, software and systems such as controls, instruments, computer workstation, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years. See other specification sections for any exceptions and/or additional requirements.
2. Refer to all other sections for quality assurance requirements for systems and equipment specified therein.
3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
4. The products and execution of work specified in Division 33 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments shall be enforced, along with requirements of local utility companies. The most stringent requirements of these specifications, local codes, or utility company requirements shall always apply. Any conflicts shall be brought to the attention of the COR.

5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be of the same manufacturer and model number, or if different models are required they shall be of the same manufacturer and identical to the greatest extent possible (i.e., same model series).
6. Assembled Units: Performance and warranty of all components that make up an assembled unit shall be the responsibility of the manufacturer of the completed assembly.
7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
8. Use of asbestos products or equipment or materials containing asbestos is prohibited.

E. HVAC Equipment Service Providers: Service providers shall be authorized and trained by the manufacturers of the equipment supplied. These providers shall be capable of responding onsite and provide acceptable service to restore equipment operations within 4 hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shutdown of equipment; or within 48 hours in a non-emergency. Submit names, mail and e-mail addresses and phone numbers of service personnel and companies providing service under these conditions for (as applicable to the project): fans, air handling units, chillers, cooling towers, control systems, pumps, critical instrumentation, computer workstation and programming.

F. HVAC Mechanical Systems Welding: Before any welding is performed, Contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME BPVC Section IX. Provide proof of current certification.
2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
3. Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
4. All welds shall be stamped according to the provisions of the AWS or ASME as required herein and by the associated code.

G. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR with submittals. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material and removal by the Contractor and no additional cost or time to the Government.

H. Execution (Installation, Construction) Quality:

1. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract documents to the COR for resolution. Provide written hard copies and computer files on CD or DVD of manufacturer’s installation instructions to the COR with submittals prior to commencing installation of any item. Installation of the item will not be allowed to proceed until the recommendations are received and approved by the VA. Failure to furnish these recommendations is a cause for rejection of the material.
2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to, all types of valves, filters and strainers, transmitters, control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to the COR for resolution. Failure of the Contractor to resolve or point out any issues will result in the Contractor correcting at no additional cost or time to the Government.
3. Complete coordination/shop drawings shall be required in accordance with Article, SUBMITTALS. Construction work shall not start on any system until the coordination/shop drawings have been approved by VA.
4. Workmanship/craftsmanship will be of the highest quality and standards. The VA reserves the right to reject any work based on

poor quality of workmanship this work shall be removed and done again at no additional cost or time to the Government.

I. Upon request by Government, provide lists of previous installations for selected items of equipment. Include contact persons who will serve as references, with current telephone numbers and e-mail addresses.

J. Guaranty: Warranty of Construction, FAR Clause 52.246-21.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:

1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage or theft.
2. Large equipment such as boilers, chillers, cooling towers, fans, and air handling units if shipped on open trailer trucks shall be covered with shrink on plastics or water proof tarpaulins that provide protection from exposure to rain, road salts and other transit hazards. Protection shall be kept in place until equipment is moved into a building or installed as designed.
3. Repair damaged equipment in first class, new operating condition and appearance; or replace same as determined and directed by the COR. Such repair or replacement shall be at no additional cost or time to the Government.
4. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
5. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
6. Protect plastic piping and tanks from ultraviolet light (sunlight).

B. Cleanliness of Piping and Equipment Systems:

1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.

3. Clean interior of all tanks prior to delivery for beneficial use by the Government.
4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.7 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, VA approved substitutions and construction revisions shall be in electronic version on CD or DVD and inserted into a three-ring binder. All aspects of system operation and maintenance procedures, including applicable piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing Contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. Should the installing Contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement. Provide record drawings as follows:

1. Red-lined, hand-marked drawings are to be provided, with one paper copy and a scanned PDF version of the hand-marked drawings provided on CD or DVD.
2. As-built drawings are to be provided, with a copy of them on AutoCAD version 2016 provided on CD or DVD. The CAD drawings shall use multiple line layers with a separate individual layer for each system.

D. The as-built drawings shall indicate the location and type of all lockout/tagout points for all energy sources for all equipment and

pumps to include breaker location and numbers, valve tag numbers, etc. Coordinate lockout/tagout procedures and practices with local VA requirements.

E. Certification documentation shall be provided to COR 21 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and provide documentation/certification that all results of tests were within limits specified. Test results shall contain written sequence of test procedure with written test results annotated at each step along with the expected outcome or setpoint. The results shall include all readings, including but not limited to data on device (make, model and performance characteristics_), normal pressures, switch ranges, trip points, amp readings, and calibration data to include equipment serial numbers or individual identifications, etc.

1.8 JOB CONDITIONS – WORK IN EXISTING BUILDING

A. Building Operation: Government employees will be continuously operating and managing all facilities, including temporary facilities that serve the VAMC.

B. Maintenance of Service: Schedule all work to permit continuous service as required by the VAMC.

C. Steam and Condensate Service Interruptions: Limited steam and condensate service interruptions, as required for interconnections of new and existing systems, will be permitted by the COR during periods when the demands are not critical to the operation of the VAMC. These non-critical periods are limited to between 8 pm and 5 am in the appropriate off-season (if applicable). Provide at least 10 working days advance notice to the COR. The request shall include a detailed plan on the proposed shutdown and the intended work to be done along with manpower levels. All equipment and materials must be onsite and verified with plan 5 days prior to the shutdown or it will need to be rescheduled.

D. Phasing of Work: Comply with all requirements shown on contract documents. Contractor shall submit a complete detailed phasing plan/schedule with manpower levels prior to commencing work. The

phasing plan shall be detailed enough to provide milestones in the process that can be verified.

E. Building Working Environment: Maintain the architectural and structural integrity of the building and the working environment at all times. Maintain the interior of building at 18 degrees C (65 degrees F) minimum. Limit the opening of doors, windows or other access openings to brief periods as necessary for rigging purposes. Storm water or ground water leakage is prohibited. Provide daily clean-up of construction and demolition debris on all floor surfaces and on all equipment being operated by VA. Maintain all egress routes and safety systems/devices.

F. Acceptance of Work for Government Operation: As new equipment, systems and facilities are made available for operation and these items are deemed of beneficial use to the Government, inspections will be made, and tests will be performed. Based on the inspections, a list of contract deficiencies will be issued to the Contractor. After correction of deficiencies as necessary for beneficial use, the Contracting Officer will process necessary acceptance and the equipment will then be under the control and operation of Government personnel.

G. Temporary Facilities: Refer to Article, TEMPORARY PIPING AND EQUIPMENT in this section.

PART 2 - PRODUCTS

2.1 FACTORY-ASSEMBLED PRODUCTS

A. Provide maximum standardization of components to reduce spare part requirements.

B. Performance and warranty of all components that make up an assembled unit shall be the responsibility of the manufacturer of the completed assembly.

1. All components of an assembled unit need not be products of same manufacturer.
2. Constituent parts that are alike shall be products of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.

4. Contractor shall guarantee performance of assemblies of components and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

C. Equipment and components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment, which serve the same function, must be the same make and model. Exceptions must be approved by the VA but may be permitted if performance requirements cannot be met.

2.2 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational plant that conforms to contract requirements.

2.3 LIFTING ATTACHMENTS

A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.4 ELECTRIC MOTORS

A. All material and equipment furnished and installation methods shall conform to the requirements of Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT; Section 26 29 11, MOTOR CONTROLLERS; and, Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES. Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection, and operation of the systems. Provide special energy efficient premium efficiency type motors as scheduled.

2.5 EQUIPMENT AND MATERIALS IDENTIFICATION

A. Use symbols, nomenclature and equipment numbers specified, shown on the contract documents and shown in the maintenance manuals. In addition, provide bar code identification nameplate for all equipment which will allow the equipment identification code to be scanned into the system

for maintenance and inventory tracking. Identification for piping is specified in Section 09 91 00, PAINTING.

B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 5 mm (3/16 inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING permanently fastened to the equipment. Identify unit components such as coils, filters, fans, etc.

C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 5 mm (3/16 inch) high riveted or bolted to the equipment.

D. Control Items: Label all instrumentation, temperature and humidity sensors, controllers and control dampers. Identify and label each item as they appear on the control diagrams.

E. Valve Tags and Lists:

1. HVAC and Mechanical Rooms: Provide for all valves other than for equipment in Section 23 82 00, CONVECTION HEATING AND COOLING UNITS and Section 23 36 00, AIR TERMNAL UNITS.
2. Valve tags: Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 6 mm (1/4 inch) for service designation on 19-gauge 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
3. Valve lists: Typed or printed plastic coated card(s), sized 215 mm (8-1/2 inches) by 275 mm (11 inches) showing tag number, valve function and area of control, for each service or system. Punch sheets for a 3-ring notebook.
4. Provide detailed plan for each floor of the building indicating the location and valve number for each valve. Identify location of each valve with a color-coded thumb tack in ceiling.

F. Ceiling Grid Labels:

1. 50 mm (2 inch) long by 15 mm (1/2 inch) wide by 0.025 mm (1 mil) thick UV resistant metalized polyester label with red border color and black custom lettering on white background interior. Peel and stick adhesive backing. Label and adhesive manufactured specifically for use in equipment inventory tagging.
2. Custom print labels with above ceiling HVAC equipment numbers.

2.6 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping and ductwork. Refer to Section 23 07 11, HVAC AND BOILER PLANT INSULATION, for firestop pipe and duct insulation.

2.7 GALVANIZED REPAIR COMPOUND

A. Mil-P-21035B, paint form.

2.8 HVAC PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

A. Vibration Isolators: Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

B. Supports for Roof Mounted Items:

1. Equipment: Equipment rails shall be galvanized steel, minimum 1.3 mm (18 gauge), with integral baseplate, continuous welded corner seams, factory installed 50 by 100 mm (2 by 4 inches) treated wood nailer, 1.3 mm (18 gauge) galvanized steel counter flashing cap with screws, built-in cant strip, (except for gypsum or tectum deck), minimum height 275 mm (11 inches). For surface insulated roof deck, provide raised cant strip to start at the upper surface of the insulation.
2. Pipe/duct pedestals: Provide a galvanized Unistrut channel welded to U-shaped mounting brackets which are secured to side of rail with galvanized lag bolts.

C. Pipe Supports: Comply with MSS SP-58. Type Numbers specified refer to this standard. For selection and application comply with MSS SP-58. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting requirements.

D. Attachment to Concrete Building Construction:

1. Concrete insert: MSS SP-58, Type 18.
2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 100 mm (4 inches) thick when approved by the COR for each job condition.
3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 100 mm (4 inches) thick when approved by the COR for each job condition.

E. Attachment to Steel Building Construction:

1. Welded attachment: MSS SP-58, Type 22.

2. Beam clamps: MSS SP-58, Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 23 mm (7/8 inch) outside diameter.

F. Attachment to existing structure: Support from existing floor/roof frame.

G. Attachment to Wood Construction: Wood screws or lag bolts.

H. Hanger Rods: Hot-rolled steel, ASTM A36/A36M or ASTM A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 40 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.

I. Hangers Supporting Multiple Pipes (Trapeze Hangers): Galvanized, cold formed, lipped steel channel horizontal member, not less than 41 mm by 41 mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (12 gauge), designed to accept special spring held, hardened steel nuts. Trapeze hangers are prohibited for use for steam supply and condensate piping.

1. Allowable hanger load: Manufacturers rating less 91 kg (200 pounds).
2. Guide individual pipes on the horizontal member of every other trapeze hanger with 6 mm (1/4 inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 15 mm (1/2 inch) galvanized steel bands, or pre-insulated calcium silicate shield for insulated piping at each hanger.

J. Supports for Piping Systems:

1. Select hangers sized to encircle insulation on insulated piping. Refer to Section 23 07 11, HVAC AND BOILER PLANT INSULATION for insulation thickness. To protect insulation, provide Type 39 saddles for roller type supports or pre-insulated calcium silicate shields. Provide Type 40 insulation shield or pre-insulated calcium silicate shield at all other types of supports and hangers including those for pre-insulated piping.
2. Piping Systems except High and Medium Pressure Steam (MSS SP-58):

a. Standard clevis hanger: Type 1; provide locknut.
b. Riser clamps: Type 8.
c. Wall brackets: Types 31, 32 or 33.
d. Roller supports: Type 41, 43, 44 and 46.
e. Saddle support: Type 36, 37 or 38.

f. Turnbuckle: Types 13 or 15. Pre-insulate.

g. U-bolt clamp: Type 24.

h. Copper Tube:

1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, plastic coated or taped with non-adhesive isolation tape to prevent electrolysis.

2) For vertical runs use epoxy painted or plastic-coated riser clamps.

3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.

4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.

i. Supports for plastic piping: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp.

3. High and Medium Pressure Steam (MSS SP-58):

a. Provide eye rod or Type 17 eye nut near the upper attachment.

b. Piping 50 mm (2 inches) and larger: Type 43 roller hanger. For roller hangers requiring seismic bracing provide a Type 1 clevis hanger with Type 41 roller attached by flat side bars.

c. Piping with Vertical Expansion and Contraction:

1) Movement up to 20 mm (3/4 inch): Type 51 or 52 variable spring unit with integral turn buckle and load indicator.

2) Movement more than 20 mm (3/4 inch): Type 54 or 55 constant support unit with integral adjusting nut, turn buckle and travel position indicator.

4. Convertor and Expansion Tank Hangers: May be Type 1 sized for the shell diameter. Insulation where required will cover the hangers.

K. Seismic Restraint of Piping and Ductwork: Refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS. Comply with MSS SP-127.

2.9 PIPE PENETRATIONS

A. Install sleeves during construction for other than blocked out floor openings for risers in mechanical bays.

B. To prevent accidental liquid spills from passing to a lower level, provide the following:
   1. For sleeves: Extend sleeve 25 mm (1 inch) above finished floor and provide sealant for watertight joint.
   2. For blocked out floor openings: Provide 40 mm (1-1/2 inch) angle set in silicone adhesive around opening.
   3. For drilled penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.

C. Penetrations through beams or ribs are prohibited but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of COR.

D. Sheet Metal, Plastic, or Moisture-resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.

E. Cast Iron or Zinc Coated Pipe Sleeves: Provide for pipe passing through exterior walls below grade. Make space between sleeve and pipe watertight with a modular or link rubber seal. Seal shall be applied at both ends of sleeve.

F. Galvanized Steel or an alternate Black Iron Pipe with asphalt coating Sleeves: Provide for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. Provide sleeve for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, connect sleeve with floor plate.

G. Brass Pipe Sleeves: Provide for pipe passing through quarry tile, terrazzo or ceramic tile floors. Connect sleeve with floor plate.

H. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.

I. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

2.10 DUCT PENETRATIONS

A. Provide curbs for roof mounted piping, ductwork, and equipment. Curbs shall be 450 mm (18 inches) high with continuously welded seams, built-

in cant strip, interior baffle with acoustic insulation, curb bottom, hinged curb adapter.

B. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling, or wall assembly. See section 07 84 00, FIRESTOPPING.

2.11 SPECIAL TOOLS AND LUBRICANTS

A. Furnish, and turn over to the COR, tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.

C. Refrigerant Tools: Provide system charging/Evacuation equipment, gauges, fittings, and tools required for maintenance of furnished equipment.

D. Tool Containers: Hardwood or metal, permanently identified for intended service and mounted, or located, where directed by the COR.

E. Lubricants: A minimum of 0.95 L (1 quart) of oil, and 0.45 kg (1 pound) of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application.

2.12 WALL, FLOOR AND CEILING PLATES

A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.

B. Thickness: Not less than 2.4 mm (3/32 inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025 inch) for up to 80 mm (3-inch pipe), 0.89 mm (0.035 inch) for larger pipe.

C. Locations: Use where pipe penetrates floors, walls, and ceilings in exposed locations, in finished areas only. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

2.13 ASBESTOS

A. Materials containing asbestos are prohibited.

PART 3 - EXECUTION

3.1 GENERAL

A. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.

3.2 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. The coordination/shop drawings shall be submitted for review. Locate piping, sleeves, inserts, hangers, ductwork, and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Equipment coordination/shop drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review. Follow manufacturer's published recommendations for installation methods not otherwise specified.

B. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All gauges and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the contract documents.

C. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.

D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

E. Cutting Holes:

1. Cut holes through concrete and masonry by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill is prohibited, except as permitted by COR where working area space is limited.
2. Locate holes to avoid interference with structural members such as slabs, columns, ribs, beams or reinforcing. Holes shall be laid out in advance and drilling done only after approval by COR. If

the Contractor considers it necessary to drill through structural members, this matter shall be referred to COR for approval.

3. Do not penetrate membrane waterproofing.

F. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.

G. Electrical Interconnection of Instrumentation or Controls: This generally not shown but must be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments, and computer workstations. Devices shall be located so they are easily accessible for testing, maintenance, calibration, etc. The COR has the final determination on what is accessible and what is not. Comply with NFPA 70.

H. Protection and Cleaning:

1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the COR. Damaged or defective items in the opinion of the COR, shall be replaced.
2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

I. Install gauges, thermometers, valves, and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

J. Install steam piping expansion joints as per manufacturer’s recommendations.

K. Work in Existing Building:

1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01

00 00, GENERAL REQUIREMENTS for relocation of existing equipment, alterations, and restoration of existing building(s).

2. As specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will least interfere with normal operation of the facility.

L. Switchgear/Electrical Equipment Drip Protection: Every effort shall be made to eliminate the installation of pipe above electrical and data/telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum of joints. Installation of piping, ductwork, leak protection apparatus or other installations foreign to the electrical installation shall not be located in the space equal to the width and depth of the equipment and extending from to a height of 1.8 m (6 feet) above the equipment or to ceiling structure, whichever is lower (NFPA 70).

M. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance or inspections, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost or time to the Government.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to motors, fans, pumps, belt guards, transformers, high voltage lines, conduit and raceways, piping, hot surfaces, and ductwork. The COR has final determination on whether an installation meets this requirement or not.

3.3 TEMPORARY PIPING AND EQUIPMENT

A. Continuity of operation of existing facilities will generally require temporary installation or relocation of equipment and piping.

B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The

requirements of Article, ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING apply.

C. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining in service.

3.4 RIGGING

A. Design is based on application of available equipment. Openings in building structures are planned to accommodate design scheme.

B. Alternative methods of equipment delivery may be offered by Contractor and will be considered by Government under specified restrictions of phasing and maintenance of service requirements as well as structural integrity of the building.

C. Close all openings in the building when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.

D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility. Upon request, the Government will check structure adequacy and advise Contractor of recommended restrictions.

E. Contractor shall check all clearances, weight limitations and shall offer a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.

F. Follow approved rigging plan.

G. Restore building to original condition upon completion of rigging work.

3.5 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels designed by a structural engineer, secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the COR.

B. Use of chain pipe supports; wire or strap hangers; wood for blocking, stays and bracing; or, hangers suspended from piping above are

prohibited. Replace or thoroughly clean rusty products and paint with zinc primer.

C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 15 mm (1/2 inch) clearance between pipe or piping covering and adjacent work.

D. HVAC Horizontal Pipe Support Spacing: Refer to MSS SP-58. Provide additional supports at valves, strainers, in-line pumps and other heavy components. Provide a support within one foot of each elbow.

E. HVAC Vertical Pipe Supports:

1. Up to 150 mm (6-inch pipe), 9 m (30 feet) long, bolt riser clamps to the pipe below couplings, or welded to the pipe and rests supports securely on the building structure.
2. Vertical pipe larger than the foregoing, support on base elbows or tees, or substantial pipe legs extending to the building structure.

F. Overhead Supports:

1. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
2. Tubing and capillary systems shall be supported in channel troughs.

G. Floor Supports:

1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Concrete bases and structural systems shall be anchored and doweled to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
2. Bases and supports shall not be located and installed until equipment mounted thereon has been approved. Bases shall be sized to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Structural contract documents shall be reviewed for additional requirements. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.

3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.
4. For seismic anchoring, refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

3.6 MECHANICAL DEMOLITION

A. Rigging access, other than indicated on the contract documents, shall be provided by the Contractor after approval for structural integrity by the COR. Such access shall be provided without additional cost or time to the Government. Where work is in an operating plant, provide approved protection from dust and debris at all times for the safety of plant personnel and maintenance of plant operation and environment of the plant.

B. In an operating facility, maintain the operation, cleanliness, and safety. Government personnel will be carrying on their normal duties of operating, cleaning, and maintaining equipment and plant operation. Confine the work to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Debris accumulated in the area to the detriment of plant operation is prohibited. Perform all flame cutting to maintain the fire safety integrity of this plant. Adequate fire extinguishing facilities shall be available at all times. Perform all work in accordance with recognized fire protection standards. Inspection will be made by personnel of the VAMC, and Contractor shall follow all directives of the COR with regard to rigging, safety, fire safety, and maintenance of operations.

C. Unless specified otherwise, all piping, wiring, conduit, and other devices associated with the equipment not re-used in the new work shall be completely removed from Government property. This includes all concrete pads, pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. All openings shall be sealed after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with contract documents where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the contract documents

of the other disciplines in the project for additional facilities to be demolished or handled.

D. All indicated valves including gate, globe, ball, butterfly and check, all pressure gauges and thermometers with wells shall remain Government property and shall be removed and delivered to COR and stored as directed. The Contractor shall remove all other material and equipment, devices and demolition debris under these contract documents. Such material shall be removed from Government property expeditiously and shall not be allowed to accumulate.

E. Asbestos Insulation Removal: Conform to Section 02 82 13, GLOVEBAG ASBESTOS ABATEMENT.

3.7 CLEANING AND PAINTING

A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Government, the plant facilities, equipment and systems shall be thoroughly cleaned and painted. Refer to Section 09 91 00, PAINTING.

B. In addition, the following special conditions apply:

1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks. All rust shall be removed prior to painting and from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.
2. The following material and equipment shall not be painted:
   a. Motors, controllers, control switches, and safety switches.
   b. Control and interlock devices.
   c. Regulators.
   d. Pressure reducing valves.
   e. Control valves and thermostatic elements.
   f. Lubrication devices and grease fittings.
   g. Copper, brass, aluminum, stainless steel and bronze surfaces.
   h. Valve stems and rotating shafts.
   i. Pressure gauges and thermometers.
   j. Glass.
   k. Nameplates.
3. Control and instrument panels shall be cleaned, damaged surfaces repaired, and shall be touched-up with matching paint obtained from panel manufacturer.

4. Pumps, motors, steel, and cast-iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same paint type and color as utilized by the pump manufacturer.
5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats. This may include painting exposed metals where hangers were removed or where equipment was moved or removed.
6. Paint shall withstand the following temperatures without peeling or discoloration:
   a. Condensate and Feedwater: 38 degrees C (100 degrees F) on insulation jacket surface and 121 degrees C (250 degrees F) on metal pipe surface.
   b. Steam: 52 degrees C (125 degrees F) on insulation jacket surface and 190 degrees C (374 degrees F) on metal pipe surface.
7. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment, if necessary, to achieve this.
8. Lead based paints are prohibited.

3.8 IDENTIFICATION SIGNS

A. Provide laminated plastic signs, with engraved lettering not less than 5 mm (3/16 inch) high, designating functions, for all equipment, switches, motor controllers, relays, meters, control devices, including automatic control valves. Nomenclature and identification symbols shall correspond to that used in maintenance manual, and in diagrams specified elsewhere. Attach by chain, adhesive, or screws.

B. Factory Built Equipment: Metal plate, securely attached, with name and address of manufacturer, serial number, model number, size, performance.

C. Pipe Identification: Refer to Section 09 91 00, PAINTING.

D. Attach ceiling grid label on ceiling grid location directly underneath above-ceiling air terminal, control system component, valve, filter unit, fan etc.

3.9 MOTOR AND DRIVES

A. Use synchronous belt drives only on equipment controlled by soft starters or variable frequency drive motor controllers without a bypass contactor. Use V-belt drives on all other applications.

B. Alignment of V-Belt Drives: Set driving and driven shafts parallel and align so that the corresponding grooves are in the same plane.

C. Alignment of Synchronous Belt Drives: Set driving and driven shafts parallel and align so that the corresponding pulley flanges are in the same plane.

D. Alignment of Direct-Connect Drives: Securely mount motor in accurate alignment so that shafts are per coupling manufacturer’s tolerances when both motor and driven machine are operating at normal temperatures.

3.10 LUBRICATION

A. All equipment and devices requiring lubrication shall be lubricated prior to initial operation. Field-check all devices for proper lubrication.

B. All devices and equipment shall be equipped with required lubrication fittings or devices. A minimum of 0.95 liter (1 quart) of oil and 0.45 kg (1 pound) of grease of manufacturer's recommended grade and type for each different application shall be provided; also provide 12 grease sticks for lubricated plug valves. Deliver all materials to COR in unopened containers that are properly identified as to application.

C. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.

D. All lubrication points shall be extended to one side of the equipment.

3.11 STARTUP, TEMPORARY OPERATION AND TESTING

A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

C. The Commissioning Agent will observe startup and Contractor testing of selected equipment. Coordinate the startup and Contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

D. Startup of equipment shall be performed as described in equipment specifications. Vibration within specified tolerance shall be verified prior to extended operation. Temporary use of equipment is specified in

Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.

3.12 OPERATING AND PERFORMANCE TESTS

A. Prior to the final inspection, perform required tests as specified in Section 01 00 00, GENERAL REQUIREMENTS Article, TESTS, and in individual Division 23 specification sections and submit the test reports and records to the COR.

B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost or time to the Government.

C. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then conduct such performance tests and finalize control settings for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work. Rescheduling of these tests shall be requested in writing to COR for approval.

D. No adjustments may be made during the acceptance inspection. All adjustments shall have been made by this point.

E. Perform tests as required for commissioning provisions in accordance with Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

3.13 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

3.14 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for 4 hours to instruct each VA personnel responsible in operation and maintenance of the system.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

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SECTION 23 05 12
GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of motors for HVAC and steam generation equipment.

B. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

D. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

F. Section 26 29 11, MOTOR CONTROLLERS.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standard will govern.

B. American Bearing Manufacturers Association (ABMA):

9-2015.....Load Ratings and Fatigue Life for Ball Bearings

11-2014.....Load Ratings and Fatigue Life for Roller Bearings

C. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):

90.1-2019.....Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings

D. Institute of Electrical and Electronics Engineers (IEEE):

112-2017.....Standard Test Procedure for Polyphase Induction Motors and Generators

841-2009.....IEEE Standard for Petroleum and Chemical Industry-Premium-Efficiency, Severe-Duty, Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors--Up to and Including 370 kW (500 hp)

E. National Electrical Manufacturers Association (NEMA):

MG 1-2018.....Motors and Generators

MG 2-2014.....Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

250-2018.....Enclosures for Electrical Equipment (1000 Volts Maximum)

F. National Fire Protection Association (NFPA):

70-2020.....National Electrical Code (NEC)

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT", with applicable paragraph identification.

C. Submit motor submittals with driven equipment.

D. Shop Drawings:

1. Provide documentation to demonstrate compliance with contract documents.
2. Motor nameplate information shall be submitted including electrical ratings, efficiency, bearing data, power factor, frame size, dimensions, mounting details, materials, horsepower, voltage, phase, speed (RPM), enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.

E. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

F. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:

1. Include complete list indicating all components of the systems.
2. Include complete diagrams of the internal wiring for each item of equipment.

3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

G. Certification: Two weeks prior to final inspection, unless otherwise noted, certification shall be submitted to the COR stating that the motors have been properly applied, installed, adjusted, lubricated, and tested.

H. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

I. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

1.5 AS-BUILT DOCUMENTATION

A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, VA approved substitutions and construction revisions shall be in electronic version on CD or DVD and inserted into a three-ring binder. All aspects of system operation and maintenance procedures, including applicable piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and shall provide the complete set at the time of final systems certification testing. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement. Provide record drawings as follows:

1. Red-lined, hand-marked drawings are to be provided, with one paper copy and a scanned PDF version of the hand-marked drawings provided on CD or DVD.
2. As-built drawings are to be provided, with a copy of them on AutoCAD version 2016 provided on CD or DVD. The CAD drawings shall use multiple line layers with a separate individual layer for each system.

D. The as-built drawings shall indicate the location and type of all lockout/tagout points for all energy sources for all equipment and pumps to include breaker location and numbers, valve tag numbers, etc. Coordinate lockout/tagout procedures and practices with local VA requirements.

E. Certification documentation shall be provided to COR 21 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and provide documentation/certification that all results of tests were within limits specified. Test results shall contain written sequence of test procedure with written test results annotated at each step along with the expected outcome or setpoint. The results shall include all readings, including but not limited to data on device (make, model and performance characteristics), normal pressures, switch ranges, trip points, amp readings, and calibration data to include equipment serial numbers or individual identifications, etc.

PART 2 - PRODUCTS

2.1 MOTORS

A. For alternating current, fractional and integral horsepower motors, NEMA MG 1 and NEMA MG 2 shall apply.

B. For severe duty TEFC motors, IEEE 841 shall apply.

C. All material and equipment furnished and installation methods shall conform to the requirements of Section 26 29 11, MOTOR CONTROLLERS; and Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES. Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems. Provide premium efficiency type motors. Unless otherwise specified for a

particular application, use electric motors with the following requirements.

D. Single-phase Motors: Motors for centrifugal fans and pumps may be split phase or permanent split capacitor (PSC) type. Provide capacitor-start type for hard starting applications.

E. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type.

1. Two Speed Motors: Each two-speed motor shall have two separate windings. Provide a time- delay (20 seconds minimum) relay for switching from high to low speed.

F. Voltage ratings shall be as follows:

1. Single phase:
   a. Motors connected to 120-volt systems: 115 volts.
   b. Motors connected to 208-volt systems: 200 volts.
   c. Motors connected to 240-volt or 480-volt systems: 230/460 volts, dual connection.
2. Three phase:
   a. Motors connected to 208-volt systems: 200 volts.
   b. Motors, less than 74.6 kW (100 hp), connected to 240-volt or 480-volt systems: 208-230/460 volts, dual connection.
   c. Motors, 74.6 kW (100 hp) or larger, connected to 240-volt systems: 230 volts.
   d. Motors, 74.6 kW (100 hp) or larger, connected to 480-volt systems: 460 volts.
   e. Motors connected to high voltage systems (Over 600V): Shall conform to NEMA MG 1 for connection to the nominal system voltage shown on the drawings.

G. Number of phases shall be as follows:

1. Motors, less than 373 W (1/2 hp): Single phase.
2. Motors, 373 W (1/2 hp) and larger: 3 phase.
3. Exceptions:
   a. Hermetically sealed motors.
   b. Motors for equipment assemblies, less than 746 W (1 hp), may be single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.

H. Horsepower ratings shall be adequate for operating the connected loads continuously in the prevailing ambient temperatures in areas where the

motors are installed, without exceeding the NEMA standard temperature rises for the motor insulation.

I. Motor designs, as indicated by the NEMA code letters, shall be coordinated with the connected loads to assure adequate starting, acceleration, and running torque without exceeding nameplate ratings or considering service factor.

J. Motor Enclosures:

1. Shall be the NEMA types as specified and/or shown in the Contract Documents.
2. Where the types of motor enclosures are not shown on the drawings, they shall be the NEMA types per NEMA 250, which are most suitable for the environmental conditions where the motors are being installed. Enclosure requirements for certain conditions are as follows:
   a. Motors located outdoors, indoors in wet or high humidity locations, or in unfiltered airstreams shall be totally enclosed type.
   b. Where motors are located in an NEC 511 classified area, provide TEFC explosion proof motor enclosures.
   c. Where motors are located in a corrosive environment, provide TEFC enclosures with corrosion resistant finish.
3. Enclosures shall be primed and finish coated at the factory with manufacturer's prime coat and standard finish.

K. Electrical Design Requirements:

1. Motors shall be continuous duty.
2. The insulation system shall be rated minimum of Class B, 130 degrees C (266 degrees F).
3. The maximum temperature rise by resistance at rated power shall not exceed Class B limits, 80 degrees C (176 degrees F).
4. The speed/torque and speed/current characteristics shall comply with NEMA Design A or B, as specified.
5. Motors shall be suitable for full voltage starting, unless otherwise noted. Coordinate motor features with applicable motor controllers.
6. Motors for variable frequency drive applications shall adhere to NEMA MG 1, Part 30, Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General-Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency

Controls or Both, or NEMA MG 1, Part 31, Definite-Purpose Inverter-Fed Polyphase Motors.

L. Mechanical Design Requirements:

1. Bearings shall be rated in accordance with ABMA 9 or ABMA 11 for a minimum fatigue life of 26,280 hours for belt-driven loads and 100,000 hours for direct-drive loads based on L10 (Basic Rating Life) at full load direct coupled, except vertical high thrust motors which require a 40,000 hours rating. A minimum fatigue life of 40,000 hours is required for VFD drives.
2. Vertical motors shall be capable of withstanding a momentary up thrust of at least 30 percent of normal down thrust.
3. Grease lubricated bearings shall be designed for electric motor use. Grease shall be capable of the temperatures associated with electric motors and shall be compatible with Polyurea based greases.
4. Grease fittings, if provided, shall be Alemite type or equivalent.
5. Oil lubricated bearings, when specified, shall have an externally visible sight glass to view oil level.
6. Vibration shall not exceed 3.8 mm (0.15 inch) per second, unfiltered peak.
7. Noise level shall meet the requirements of the application.
8. Motors on 180 frames and larger shall have provisions for lifting eyes or lugs capable of a safety factor of 5.
9. All external fasteners shall be corrosion resistant.
10. Condensation heaters, when specified, shall keep motor windings at least 5 degrees C (9 degrees F) above ambient temperature.
11. Winding thermostats, when specified shall be normally closed, connected in series.
12. Grounding provisions shall be in the main terminal box.

M. Special Requirements:

1. Where motor power requirements of equipment furnished deviate from power shown on plans, provide electrical service designed under the requirements of NFPA 70 without additional cost or time to the Government.
2. Assemblies of motors, starters, controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.

3. Wire and cable materials specified in the electrical division of the specifications shall be modified as follows:
   a. Wiring material located where temperatures can exceed 71 degrees C (160 degrees F) shall be stranded copper with Teflon FEP insulation with jacket. This includes wiring on the boilers.
   b. Other wiring at boilers and to control panels shall be NFPA 70 designation THWN.
   c. Provide shielded conductors or wiring in separate conduits for all instrumentation and control systems where recommended by manufacturer of equipment.
4. Select motor sizes so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
5. Motors utilized with variable frequency drives shall be rated "inverter-duty" per NEMA MG 1, Part 31, Definite-Purpose Inverter-Fed Polyphase Motors. Provide motor shaft grounding apparatus that will protect bearings from damage from stray currents.

N. Additional requirements for specific motors, as indicated in the other sections listed in Article, RELATED SECTIONS shall also apply.

O. NEMA Premium Efficiency Electric Motors (Motor Efficiencies): All permanently wired polyphase motors of 746 W (1 hp) or more shall meet the minimum full-load efficiencies as indicated in the following table. Motors of 746 W (1 hp) or more with open, drip-proof, or TEFC enclosures shall be NEMA premium efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

Minimum Premium Efficiencies Open Drip-Proof				**Minimum Premium Efficiencies Totally Enclosed Fan-Cooled (TEFC)**			
Rating kW (hp)	**1200 RPM**	**1800 RPM**	**3600 RPM**	**Rating kW (hp)**	**1200 RPM**	**1800 RPM**	**3600 RPM**
0.746 (1)	82.5%	85.5%	77.0%	0.746 (1)	82.5%	85.5%	77.0%
1.12 (1.5)	86.5%	86.5%	84.0%	1.12 (1.5)	87.5%	86.5%	84.0%
1.49 (2)	87.5%	86.5%	85.5%	1.49 (2)	88.5%	86.5%	85.5%
2.24 (3)	88.5%	89.5%	85.5%	2.24 (3)	89.5%	89.5%	86.5%

3.73 (5)	89.5%	89.5%	86.5%	3.73 (5)	89.5%	89.5%	88.5%
5.60 (7.5)	90.2%	91.0%	88.5%	5.60 (7.5)	91.0%	91.7%	89.5%
7.46 (10)	91.7%	91.7%	89.5%	7.46 (10)	91.0%	91.7%	90.2%

P. Minimum Power Factor at Full Load and Rated Voltage: 90 percent at 1200 RPM, 1800 RPM, and 3600 RPM. Power factor correction capacitors shall be provided unless the motor meets the 0.90 requirement without it or if the motor is controlled by a variable frequency drive. The power factor correction capacitors shall be able to withstand high voltage transients and power line variations without breakdown.

Q. Energy Efficiency of Small Motors (Motor Efficiencies): All motors under 746 W (1 hp) shall meet the requirements of the DOE Small Motor Regulation.

Polyphase Open Motors Average full load efficiency				**Capacitor-start capacitor-run and capacitor-start induction run open motors Average full load efficiency**			
Rating kW (hp)	**6 poles**	**4 poles**	**2 poles**	**Rating kW (hp)**	**6 poles**	**4 poles**	**2 poles**
0.18 (0.25)	67.5	69.5	65.6	0.18 (0.25)	62.2	68.5	66.6
0.25 (0.33)	71.4	73.4	69.5	0.25 (0.33)	66.6	72.4	70.5
0.37 (0.5)	75.3	78.2	73.4	0.37 (0.5)	76.2	76.2	72.4
0.55 (0.75)	81.7	81.1	76.8	0.55 (0.75)	80.2	81.8	76.2

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install motors in accordance with manufacturer’s recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

B. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.

3.2 FIELD TESTS

A. All tests shall be witnessed by the Commissioning Agent or by the COR.

B. Perform an electric insulation resistance Test using a megohmmeter on all motors after installation, before startup. All shall test free from grounds.

C. Perform Load test in accordance with IEEE 112, Test Method B, to determine freedom from electrical or mechanical defects and compliance with performance data.

D. Insulation Resistance: Not less than one-half meg-ohm between stator conductors and frame, to be determined at the time of final inspection.

E. All test data shall be complied into a report form for each motor and provided to the contracting officer or their representative.

3.3 STARTUP AND TESTING

A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

C. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

3.4 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

3.5 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for 4 hours to instruct each VA personnel responsible in operation and maintenance of the system.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

- - - E N D - - -

SECTION 23 05 41
NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the application of noise control measures, seismic restraint for equipment, and vibration control techniques for pumps, fans, and terminal units.

B. A complete listing of all common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
Noise criteria, seismic restraints for equipment, vibration tolerance, and vibration isolation for HVAC and plumbing work.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and SAMPLES.

B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

C. Section 23 31 00, HVAC DUCTS and CASINGS.

D. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

1.3 QUALITY ASSURANCE

A. Refer to article, QUALITY ASSURANCE in specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

B. Noise Criteria:

1. Noise levels in all 8 octave bands due to equipment and duct systems shall not exceed following NC levels:

TYPE OF ROOM	**NC LEVEL**
Corridors (Nurse Stations)	40
Corridors(Public)	40
Shops	50

2. For equipment which has no sound power ratings scheduled on the plans, the contractor shall select equipment such that the foregoing noise criteria, local ordinance noise levels, and OSHA requirements are not exceeded. Selection procedure shall be in accordance with ASHRAE Fundamentals Handbook, Chapter 8, Sound and Vibration.

3. An allowance, not to exceed 5db, may be added to the measured value to compensate for the variation of the room attenuating effect between room test condition prior to occupancy and design condition after occupancy which may include the addition of sound absorbing

material, such as, furniture. This allowance may not be taken after occupancy. The room attenuating effect is defined as the difference between sound power level emitted to room and sound pressure level in room.

4. In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.

C. Seismic Restraint Requirements:

1. Equipment:
   a. All mechanical equipment not supported with isolators external to the unit shall be securely anchored to the structure. Such mechanical equipment shall be properly supported to resist a horizontal force of 50 percent of the weight of the equipment furnished.
   b. All mechanical equipment mounted on vibration isolators shall be provided with seismic restraints capable of resisting a horizontal force of 100 percent of the weight of the equipment furnished.
2. Piping: Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
3. Ductwork: Refer to specification Section 23 31 00, HVAC DUCTS AND CASINGS.

D. Allowable Vibration Tolerances for Rotating, Non-reciprocating Equipment: Not to exceed a self-excited vibration maximum velocity of 5 mm per second (0.20 inch per second) RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal and axial directions or measured at equipment mounting feet if bearings are concealed. Measurements for internally isolated fans and motors may be made at the mounting feet.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data:

1. Vibration isolators:
   a. Floor mountings
   b. Hangers
   c. Snubbers

d. Thrust restraints

2. Bases.

3. Seismic restraint provisions and bolting.

4. Acoustical enclosures.

C. Isolator manufacturer shall furnish with submittal load calculations for selection of isolators, including supplemental bases, based on lowest operating speed of equipment supported.

D. Seismic Requirements: Submittals are required for all equipment anchors, supports and seismic restraints. Submittals shall include weights, dimensions, standard connections, and manufacturer's certification that all specified equipment will withstand seismic Lateral Force requirements as shown on drawings.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):

Handbook 2017.....Fundamentals Handbook, Chapter 8, Sound and Vibration

C. American Society for Testing and Materials (ASTM):

A123/A123M-2017.....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A307-2017.....Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

D2240-05(2010).....Standard Test Method for Rubber Property - Durometer Hardness

D. Manufacturers Standardization (MSS):

SP-58-2018.....Pipe Hangers and Supports-Materials, Design and Manufacture

E. Occupational Safety and Health Administration (OSHA):

29 CFR 1910.95.....Occupational Noise Exposure

F. American Society of Civil Engineers (ASCE):

ASCE 7-2017.....Minimum Design Loads for Buildings and Other Structures.

G. American National Standards Institute / Sheet Metal and Air Conditioning Contractor’s National Association (ANSI/SMACNA):

001-2008.....Seismic Restraint Manual: Guidelines for Mechanical Systems, 3rd Edition.

H. International Code Council (ICC):

IBC 2018.....International Building Code.

I. Department of Veterans Affairs (VA):

H-18-8 2020.....Seismic Design Requirements.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Type of isolator, base, and minimum static deflection shall be as required for each specific equipment application as recommended by isolator or equipment manufacturer but subject to minimum requirements indicated herein and in the schedule on the drawings.

B. Elastometric Isolators shall comply with ASTM D2240 and be oil resistant neoprene with a maximum stiffness of 60 durometer and have a straight-line deflection curve.

C. Exposure to weather: Isolator housings to be either hot dipped galvanized or powder coated to ASTM B117 salt spray testing standards. Springs to be powder coated or electro galvanized. All hardware to be electro galvanized. In addition, provide limit stops to resist wind velocity. Velocity pressure established by wind shall be calculated in accordance with section 1609 of the International Building Code. A minimum wind velocity of 75 mph shall be employed.

D. Uniform Loading: Select and locate isolators to produce uniform loading and deflection even when equipment weight is not evenly distributed.

E. Color code isolators by type and size for easy identification of capacity.

2.2 SEISMIC RESTRAINT REQUIREMENTS FOR EQUIPMENTS

A. Bolt pad mounted equipment, without vibration isolators, to the floor or other support using ASTM A307 standard bolting material.

B. Floor mounted equipment, with vibration Isolators: Type SS. Where Type N isolators are used provide channel frame base horizontal restraints bolted to the floor, or other support, on all sides of the equipment Size and material required for the base shall be as recommended by the isolator manufacturer.

C. On all sides of suspended equipment, provide bracing for rigid supports and provide restraints for resiliently supported equipment.

2.3 VIBRATION ISOLATORS

A. Floor Mountings:

1. Double Deflection Neoprene (Type N): Shall include neoprene covered steel support plated (top and bottom), friction pads, and necessary bolt holes.
2. Spring Isolators (Type S): Shall be free-standing, laterally stable and include acoustical friction pads and leveling bolts. Isolators shall have a minimum ratio of spring diameter-to-operating spring height of 1.0 and an additional travel to solid equal to 50 percent of rated deflection.
3. Captive Spring Mount for Seismic Restraint (Type SS):
   a. Design mounts to resiliently resist seismic forces in all directions. Snubbing shall take place in all modes with adjustment to limit upward, downward, and horizontal travel to a maximum of 6 mm (1/4-inch) before contacting snubbers. Mountings shall have a minimum rating of one G coefficient of gravity as calculated and certified by a registered structural engineer.
   b. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50 percent of the rated deflection. Mountings shall have ports for spring inspection. Provide an all directional neoprene cushion collar around the equipment bolt.
4. Spring Isolators with Vertical Limit Stops (Type SP): Similar to spring isolators noted above, except include a vertical limit stop to limit upward travel if weight is removed and also to reduce movement and spring extension due to wind loads. Provide clearance around restraining bolts to prevent mechanical short circuiting. Isolators shall have a minimum seismic rating of one G.
5. Pads (Type D), Washers (Type W), and Bushings (Type L): Pads shall be natural rubber or neoprene waffle, neoprene and steel waffle, or reinforced duck and neoprene. Washers and bushings shall be reinforced duck and neoprene. Washers and bushings shall be reinforced duck and neoprene. Size pads for a maximum load of 345 kPa (50 pounds per square inch).

6. Seismic Pad (Type DS): Pads shall be natural rubber / neoprene waffle with steel top plate and drilled for an anchor bolt. Washers and bushings shall be reinforced duck and neoprene. Size pads for a maximum load of 345 kPa (50 pounds per square inch).

B. Hangers: Shall be combination neoprene and springs unless otherwise noted and shall allow for expansion of pipe.
   1. Combination Neoprene and Spring (Type H): Vibration hanger shall contain a spring and double deflection neoprene element in series. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional travel of 50 percent between design height and solid height. Spring shall permit a 15-degree angular misalignment without rubbing on hanger box.
   2. Spring Position Hanger (Type HP): Similar to combination neoprene and spring hanger except hanger shall hold piping at a fixed elevation during installation and include a secondary adjustment feature to transfer load to spring while maintaining same position.
   3. Neoprene (Type HN): Vibration hanger shall contain a double deflection type neoprene isolation element. Hanger rod shall be separated from contact with hanger bracket by a neoprene grommet.
   4. Spring (Type HS): Vibration hanger shall contain a coiled steel spring in series with a neoprene grommet. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional travel of 50 percent between design height and solid height. Spring shall permit a 15-degree angular misalignment without rubbing on hanger box.
   5. Hanger supports for piping 50 mm (2 inches) and larger shall have a pointer and scale deflection indicator.
   6. Hangers used in seismic applications shall be provided with a neoprene and steel rebound washer installed ¼’ clear of bottom of hanger housing in operation to prevent spring from excessive upward travel.

C. Snubbers: Each spring mounted base shall have a minimum of four all-directional or eight two directional (two per side) seismic snubbers that are double acting. Elastomeric materials shall be shock absorbent neoprene bridge quality bearing pads, maximum 60 durometer, replaceable and have a minimum thickness of 6 mm (1/4 inch). Air gap between hard

and resilient material shall be not less than 3 mm (1/8 inch) nor more than 6 mm (1/4 inch). Restraints shall be capable of withstanding design load without permanent deformation.

D. Thrust Restraints (Type THR): Restraints shall provide a spring element contained in a steel frame with neoprene pads at each end attachment. Restraints shall have factory preset thrust and be field adjustable to allow a maximum movement of 6 mm (1/4 inch) when the fan starts and stops. Restraint assemblies shall include rods, angle brackets and other hardware for field installation.

2.4 BASES

A. Rails (Type R): Design rails with isolator brackets to reduce mounting height of equipment and cradle machines having legs or bases that do not require a complete supplementary base. To assure adequate stiffness, height of members shall be a minimum of 1/12 of longest base dimension but not less than 100 mm (4 inches). Where rails are used with neoprene mounts for small fans or close coupled pumps, extend rails to compensate overhang of housing.

B. Integral Structural Steel Base (Type B): Design base with isolator brackets to reduce mounting height of equipment which require a complete supplementary rigid base. To assure adequate stiffness, height of members shall be a minimum of 1/12 of longest base dimension, but not less than 100 mm (four inches).

C. Inertia Base (Type I): Base shall be a reinforced concrete inertia base. Pour concrete into a welded steel channel frame, incorporating pre-located equipment anchor bolts and pipe sleeves. Level the concrete to provide a smooth uniform bearing surface for equipment mounting. Provide grout under uneven supports. Channel depth shall be a minimum of 1/12 of longest dimension of base but not less than 150 mm (six inches). Form shall include 13-mm (1/2-inch) reinforcing bars welded in place on minimum of 203 mm (eight inch) centers running both ways in a layer 40 mm (1-1/2 inches) above bottom. Use height saving brackets in all mounting locations. Weight of inertia base shall be equal to or greater than weight of equipment supported to provide a maximum peak-to-peak displacement of 2 mm (1/16 inch).

D. Curb Mounted Isolation Base (Type CB): Fabricate from aluminum to fit on top of standard curb with overlap to allow water run-off and have wind and water seals which shall not interfere with spring action.

Provide resilient snubbers with 6 mm (1/4 inch) clearance for wind resistance. Top and bottom bearing surfaces shall have sponge type weather seals. Integral spring isolators shall comply with Spring Isolator (Type S) requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Vibration Isolation:

1. No metal-to-metal contact will be permitted between fixed and floating parts.
2. Connections to Equipment: Allow for deflections equal to or greater than equipment deflections. Electrical, drain, piping connections, and other items made to rotating or reciprocating equipment (pumps, compressors, etc.) which rests on vibration isolators, shall be isolated from building structure for first three hangers or supports with a deflection equal to that used on the corresponding equipment.
3. Common Foundation: Mount each electric motor on same foundation as driven machine. Hold driving motor and driven machine in positive rigid alignment with provision for adjusting motor alignment and belt tension. Bases shall be level throughout length and width. Provide shims to facilitate pipe connections, leveling, and bolting.
4. Provide heat shields where elastomers are subject to temperatures over 38 degrees C (l00 degrees F).
5. Extend bases for pipe elbow supports at discharge and suction connections at pumps. Pipe elbow supports shall not short circuit pump vibration to structure.
6. Non-rotating equipment such as heat exchangers and convertors shall be mounted on isolation units having the same static deflection as the isolation hangers or support of the pipe connected to the equipment.

B. Inspection and Adjustments: Check for vibration and noise transmission through connections, piping, ductwork, foundations, and walls. Adjust, repair, or replace isolators as required to reduce vibration and noise transmissions to specified levels.

3.2 ADJUSTING

A. Adjust vibration isolators after piping systems are filled and equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4inch (6-mm) movement during start and stop.

D. Adjust active height of spring isolators.

E. Adjust snubbers according to manufacturer's recommendations.

F. Adjust seismic restraints to permit free movement of equipment within normal mode of operation.

G. Torque anchor bolts according to equipment manufacturer's recommendations to resist seismic forces.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

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SELECTION GUIDE FOR VIBRATION ISOLATORS

EQUIPMENT		ON GRADE			20FT FLOOR SPAN			30FT FLOOR SPAN			40FT FLOOR SPAN			50FT FLOOR SPAN		
		BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL
PUMPS																
CLOSE COUPLED	UP TO 1-1/2 HP	---	---	---	---	D,L, W	---	---	D,L, W	---	---	D,L, W	---	---	D,L, W	---
	2 HP & OVER	---	---	---	I	S	0.8	I	S	1.5	I	S	1.5	I	S	2.0

EQUIPMENT		ON GRADE			20FT FLOOR SPAN			30FT FLOOR SPAN			40FT FLOOR SPAN			50FT FLOOR SPAN		
		BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL
LARGE INLINE	Up to 25 HP	---	---	---	---	S	0.75	---	S	1.50	---	S	1.50	---	---	NA
	26 HP THRU 30 HP	---	---	---	---	S	1.0	---	S	1.50	---	S	2.50	---	---	NA
BASE MOUNTED	UP TO 10 HP	---	---	---	---	D,L, W	---	---	D,L, W	---	---	D,L, W	---	---	D,L, W	---
	15 HP THRU 40 HP	I	S	1.0	I	S	1.0	I	S	2.0	I	S	2.0	I	S	2.0
	50 HP & OVER	I	S	1.0	I	S	1.0	I	S	2.0	I	S	2.5	I	S	2.5
ROOF FANS																
ABOVE OCCUPIED AREAS:																
5 HP & OVER		---	---	---	CB	S	1.0	CB	S	1.0	CB	S	1.0	CB	S	1.0
CENTRIFUGAL FANS																
UP TO 50 HP:																
UP TO 200 RPM		B	N	0.3	B	S	2.5	B	S	2.5	B	S	3.5	B	S	3.5
201 - 300 RPM		B	N	0.3	B	S	2.0	B	S	2.5	B	S	2.5	B	S	3.5
301 - 500 RPM		B	N	0.3	B	S	2.0	B	S	2.0	B	S	2.5	B	S	3.5
501 RPM & OVER		B	N	0.3	B	S	2.0	B	S	2.0	B	S	2.0	B	S	2.5

EQUIPMENT	ON GRADE			20FT FLOOR SPAN			30FT FLOOR SPAN			40FT FLOOR SPAN			50FT FLOOR SPAN		
	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL
60 HP & OVER:															
UP TO 300 RPM	B	S	2.0	I	S	2.5	I	S	3.5	I	S	3.5	I	S	3.5
301 - 500 RPM	B	S	2.0	I	S	2.0	I	S	2.5	I	S	3.5	I	S	3.5
501 RPM & OVER	B	S	1.0	I	S	2.0	I	S	2.0	I	S	2.5	I	S	2.5
AIR HANDLING UNIT PACKAGES															
SUSPENDED:															
UP THRU 5 HP	---	---	---	---	H	1.0	---	H	1.0	---	H	1.0	---	H	1.0
7-1/2 HP & OVER:															
UP TO 500 RPM	---	---	---	---	H, THR	1.5	---	H, THR	2.5	---	H, THR	2.5	---	H, THR	2.5
501 RPM & OVER	---	---	---	---	H, THR	0.8	---	H, THR	0.8	---	H,THR	0.8	---	H,THR	2.0

EQUIPMENT	ON GRADE			20FT FLOOR SPAN			30FT FLOOR SPAN			40FT FLOOR SPAN			50FT FLOOR SPAN		
	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL	BASE TYPE	ISOL TYPE	MIN DEFL
FLOOR MOUNTED:															
UP THRU 5 HP	---	D	---	---	S	1.0	---	S	1.0	---	S	1.0	---	S	1.0
7-1/2 HP & OVER:															
UP TO 500 RPM	---	D	---	R	S, THR	1.5	R	S, THR	2.5	R	S, THR	2.5	R	S, THR	2.5
501 RPM & OVER	---	D	---	---	S, THR	0.8	---	S, THR	0.8	R	S, THR	1.5	R	S, THR	2.0
CONDENSING UNITS															
ALL	---	SS	0.25	---	SS	0.75	---	SS	1.5	CB	SS	1.5	---	---	NA

NOTES:

1. Edit the Table above to suit where isolator, other than those shown, are used, such as for seismic restraints and position limit stops.
2. For suspended floors lighter than 100 mm (4 inch) thick concrete, select deflection requirements from next higher span.
3. For separate chiller building on grade, pump isolators may be omitted.
4. Direct bolt fire pumps to concrete base. Provide pads (D) for domestic water booster pump package.
5. For projects in seismic areas, use only SS & DS type isolators and snubbers.
6. For floor mounted in-line centrifugal blowers (ARR 1): use "B" type in lieu of "R" type base.
7. Suspended: Use "H" isolators of same deflection as floor mounted.

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Testing, adjusting, and balancing (TAB) of heating, ventilating and air conditioning (HVAC) systems. TAB includes the following:
   1. Planning systematic TAB procedures.
   2. Design Review Report.
   3. Systems Inspection report.
   4. Duct Air Leakage test report.
   5. Systems Readiness Report.
   6. Balancing air and water distribution systems; adjustment of total system to provide design performance; and testing performance of equipment and automatic controls.
   7. Vibration and sound measurements.
   8. Recording and reporting results.
   9. Document critical paths of flow on reports.

B. Definitions:
   1. Basic TAB used in this Section: Chapter 39, "Testing, Adjusting and Balancing" of 2019 ASHRAE Handbook, "HVAC Applications".
   2. TAB: Testing, Adjusting and Balancing; the process of checking and adjusting HVAC systems to meet design objectives.
   3. AABC: Associated Air Balance Council.
   4. NEBB: National Environmental Balancing Bureau.
   5. TABB: Testing Adjusting and Balancing Bureau
   6. SMACNA: Sheet Metal Contractors National Association
   7. Hydronic Systems: Includes heating hot water.
   8. Air Systems: Includes all outside air, supply air, return air, exhaust air and relief air systems.
   9. Flow rate tolerance: The allowable percentage variation, minus to plus, of actual flow rate from values (design) in the contract documents.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
C. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
D. Section 23 07 11, HVAC, AND BOILER PLANT INSULATION.

E. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

F. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

G. Section 23 31 00, HVAC DUCTS AND CASINGS.

H. Section 23 36 00, AIR TERMINAL UNITS.

1.3 QUALITY ASSURANCE

A. Refer to Articles, Quality Assurance and Submittals, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC and Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

B. Qualifications:

1. TAB Agency: The TAB agency shall be a subcontractor of the General Contractor and shall report to and be paid by the General Contractor.

2. The TAB agency shall be either a certified member of AABC, NEEB, TABB or NEBB to perform TAB service for HVAC, water balancing and vibrations and sound testing of equipment. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the agency loses subject certification during this period, the General Contractor shall immediately notify the COR and submit another qualified TAB firm for approval. Any agency that has been the subject of disciplinary action by either the AABC, TABB, or NEBB within the five years preceding Contract Award shall not be eligible to perform any work related to the TAB. All work performed in this Section and in other related Sections by the TAB agency shall be considered invalid if the TAB agency loses its certification prior to Contract completion, and the successor agency’s review shows unsatisfactory work performed by the predecessor agency.

3. TAB Specialist: The TAB specialist shall be either a member of AABC or TABB or an experienced technician of the Agency certified by NEBB. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the Specialist loses subject certification during this period, the General Contractor shall immediately notify the Resident Engineer and submit another TAB Specialist for approval. Any individual that has been the subject of disciplinary action by either the AABC or the NEBB within the five years preceding Contract Award shall not be eligible to perform any duties related to the HVAC systems, including TAB. All

work specified in this Section and in other related Sections performed by the TAB specialist shall be considered invalid if the TAB Specialist loses its certification prior to Contract completion and must be performed by an approved successor.

4. TAB Specialist shall be identified by the General Contractor within 60 days after the notice to proceed. The TAB specialist will be coordinating, scheduling, and reporting all TAB work and related activities and will provide necessary information as required by the Resident Engineer. The responsibilities would specifically include:
   a. Shall directly supervise all TAB work.
   b. Shall sign the TAB reports that bear the seal of the TAB standard. The reports shall be accompanied by report forms and schematic drawings required by the TAB standard, AABC, TABB or NEBB.
   c. Would follow all TAB work through its satisfactory completion.
   d. Shall provide final markings of settings of all HVAC adjustment devices.
   e. Permanently mark location of duct test ports.
   f. Shall document critical paths from the fan or pump. These critical paths are ones in which are 100% open from the fan or pump to the terminal device. This will show the least amount of restriction is being imposed on the system by the TAB firm.
5. All TAB technicians performing actual TAB work shall be experienced and must have done satisfactory work on a minimum of 3 projects comparable in size and complexity to this project. Qualifications must be certified by the TAB agency in writing. The lead technician shall be certified by AABC, TABB or NEBB

C. Test Equipment Criteria: The instrumentation shall meet the accuracy/calibration requirements established by AABC National Standards, TABB/SMACNA International Standards, or by NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems and instrument manufacturer. Provide calibration history of the instruments to be used for test and balance purpose.

D. TAB Criteria:
1. One or more of the applicable AABC, NEBB, TABB or SMACNA publications, supplemented by ASHRAE Handbook "2019 HVAC

Applications" Chapter 39, and requirements stated herein shall be the basis for planning, procedures, and reports.

2. Flow rate tolerance: Following tolerances are allowed. For tolerances not mentioned herein follow 2011 ASHRAE Handbook "2019 HVAC Applications", Chapter 39, as a guideline. Air Filter resistance during tests, artificially imposed if necessary, shall be at least 100 percent of manufacturer recommended change over pressure drop values for pre-filters and after-filters.
   a. Air handling unit and all other fans, cubic meters/min (cubic feet per minute): Minus 0 percent to plus 10 percent.
   b. Air terminal units (maximum values): Minus 2 percent to plus 10 percent.
   d. Minimum outside air: 0 percent to plus 10 percent.
   e. Individual room air outlets and inlets, and air flow rates not mentioned above: Minus 5 percent to plus 10 percent except if the air to a space is 100 CFM or less the tolerance would be minus 5 to plus 5 percent.
3. Systems shall be adjusted for energy efficient operation as described in PART 3.
4. Typical TAB procedures and critical path results shall be demonstrated to the Resident Engineer for one air distribution system (including all fans, three terminal units, three rooms randomly selected by the COR one of which shall be a critical path) and one hydronic system (pumps and three coils) as follows:
   a. When field TAB work begins.
   b. During each partial final inspection and the final inspection for the project if requested by VA.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Submit names and qualifications of TAB agency and TAB specialists within 60 days after the notice to proceed. Submit information on three recently completed projects and a list of proposed test equipment.

C. For use by the Resident Engineer staff, submit one complete set of applicable AABC, NEBB, or TABB publications that will be the basis of TAB work.

D. Submit Following for Review and Approval:

1. Design Review Report within 90 days for conventional design projects and within 60 days for design-build projects after the system layout on air and water side is completed by the Contractor.
2. Systems inspection report on equipment and installation for conformance with design.
3. Duct Air Leakage Test Report.
4. Systems Readiness Report.
5. Intermediate and Final TAB reports covering flow balance and adjustments, performance tests, vibration tests and sound tests.
6. Include in final reports uncorrected installation deficiencies noted during TAB and applicable explanatory comments on test results that differ from design requirements.
7. Include in each report the critical path for each balanced branch (air and hydronic. Every branch shall have at least one terminal device damper 100% open.

E. Prior to request for Final or Partial Final inspection, submit completed Test and Balance report for the area with noted critical paths.

1.5 APPLICABLE PUBLICATIONS

A. The following publications form a part of this specification to the extent indicated by the reference thereto. In text the publications are referenced to by the acronym of the organization.

B. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):

Handbook 2019.....HVAC Applications ASHRAE Handbook, Chapter 39, Testing, Adjusting, and Balancing and Chapter 49, Sound and Vibration Control

C. Associated Air Balance Council (AABC):

7th Edition 2016 .....AABC National Standards for Total System Balance

D. National Environmental Balancing Bureau (NEBB):

9th Edition 2019 .....Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems

3rd Edition 2018 .....Procedural Standards for the Measurement of Sound and Vibration

2nd Edition 2019 ... Standard for Whole Building Technical Commissioning of New Construction

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

3rd Edition 2005 .....HVAC SYSTEMS Testing, Adjusting and Balancing

TABB- TAB Procedural Guide (2003)

PART 2 - PRODUCTS

2.1 PLUGS

Provide plastic plugs to seal holes drilled in ductwork for test purposes.

2.2 INSULATION REPAIR MATERIAL

See Section 23 07 11, HVAC and BOILER PLANT INSULATION Provide for repair of insulation removed or damaged for TAB work.

PART 3 - EXECUTION

3.1 GENERAL

A. Refer to TAB Criteria in Article, Quality Assurance.

B. Obtain applicable contract documents and copies of approved submittals for HVAC equipment and automatic control systems.

3.2 DESIGN REVIEW REPORT

A. The TAB Specialist shall review the Contract Plans and specifications and advise the Resident Engineer of any design deficiencies that would prevent the HVAC systems from effectively operating in accordance with the sequence of operation specified or prevent the effective and accurate TAB of the system. The TAB Specialist shall provide a report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation.

3.3 SYSTEMS INSPECTION REPORT

A. Inspect equipment and installation for conformance with design.

B. The inspection and report are to be done after air distribution equipment is on site and duct installation has begun, but well in advance of performance testing and balancing work. The purpose of the inspection is to identify and report deviations from design and ensure that systems will be ready for TAB at the appropriate time.

C. Reports: Follow check list format developed by AABC, NEBB or SMACNA (TABB), supplemented by narrative comments, with emphasis on air handling units and fans. Check for conformance with submittals. Verify

that diffuser and register sizes are correct. Check air terminal unit installation including their duct sizes and routing.

3.4 DUCT AIR LEAKAGE TEST REPORT

A. TAB Agency shall perform the leakage test as outlined in "Duct leakage Tests and Repairs" in Section 23 31 00, HVAC DUCTS and CASINGS for TAB agency's role and responsibilities in witnessing, recording, and reporting of deficiencies.

3.5 SYSTEM READINESS REPORT

A. The TAB Contractor shall measure existing air and water flow rates associated with existing systems utilized to serve renovated areas as indicated on drawings. Submit report of findings to the project COR.

B. Inspect each System to ensure that it is complete including installation and operation of controls. Submit report to RE in standard format and forms prepared and or approved by the Commissioning Agent.

C. Verify that all items such as ductwork piping, dampers, valves, ports, terminals, connectors, etc., that is required for TAB are installed. Provide a report to the Resident Engineer.

3.6 TAB REPORTS

A. Submit an intermediate report for 50 percent of systems and equipment tested and balanced to establish satisfactory test results.

B. The TAB contractor shall provide raw data immediately in writing to the Resident Engineer if there is a problem in achieving intended results before submitting a formal report.

C. If over 20 percent of readings in the intermediate report fall outside the acceptable range, the TAB report shall be considered invalid and all contract TAB work shall be repeated after engineering and construction have been evaluated and re-submitted for approval at no additional cost to the owner.

D. Do not proceed with the remaining systems until intermediate report is approved by the Resident Engineer.

3.7 TAB PROCEDURES

A. TAB shall be performed in accordance with the requirement of the Standard under which TAB agency is certified by either AABC, TABB or NEBB. Balancing shall be done proportionally to all applicable systems.

1. At least one trunk damper shall be 100% open.
2. At least one branch damper shall be 100%open per trunk.

3. At least one terminal device duct be 100% open per branch.

B. General: During TAB all related system components shall be in full operation. Fan and pump rotation, motor loads and equipment vibration shall be checked and corrected as necessary before proceeding with TAB. Set controls and/or block off parts of distribution systems to simulate design operation of variable volume air or water systems for test and balance work.

C. Coordinate TAB procedures with existing systems and any phased construction completion requirements for the project. Provide TAB reports for pre-construction air and water flow rate and for each phase of the project prior to partial final inspections of each phase of the project. Return existing areas outside the work area to pre constructed conditions.

D. Allow 5 days time in construction schedule for TAB and submission of all reports for an organized and timely correction of deficiencies.

E. Air Balance and Equipment Test: Include air handling units, fans, terminal units, fan coil units, room diffusers/outlets/inlets, computer room AC units, and laboratory fume hoods and biological safety cabinets.

1. Artificially load air filters by partial blanking to produce static air pressure drop of manufacturer’s recommended pressure drop.
2. Adjust fan speeds to provide design air flow. V-belt drives, including fixed pitch pulley requirements, are specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
3. Test and balance systems in all specified modes of operation, including variable volume, economizer, and fire emergency modes. Verify that dampers and other HVAC controls function properly.
4. Variable air volume (VAV) systems:
   a. Coordinate TAB, including system volumetric controls, with Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
   b. Section 23 36 00, AIR TERMINAL UNITS, specifies that maximum and minimum flow rates for air terminal units (ATU) be factory set. Check and readjust ATU flow rates, if necessary, to meet design criteria. Balance air distribution from ATU on full cooling maximum scheduled cubic meters per minute (cubic feet per minute). Reset room thermostats and check ATU operation from maximum to minimum cooling, to the heating mode, and back to

cooling. Record and report the heating coil leaving air temperature when the ATU is in the maximum heating mode. Record and report outdoor air flow rates under all operating conditions (The test shall demonstrate that the minimum outdoor air ventilation rate shall remain constant under al operating conditions).

c. Adjust operating pressure control setpoint to maintain the design flow to each space with the lowest setpoint.

5. Record final measurements for air handling equipment performance data sheets.

3.8 VIBRATION TESTING

A. Furnish instruments and perform vibration measurements as specified in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT. Field vibration balancing is specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.Provide measurements for all rotating HVAC equipment of 373 watts (1/2 horsepower) and larger, including centrifugal/screw compressors, cooling towers, pumps, fans and motors.

B. Record initial measurements for each unit of equipment on test forms and submit a report to the Resident Engineer. Where vibration readings exceed the allowable tolerance Contractor shall be directed to correct the problem. The TAB agency shall verify that the corrections are done and submit a final report to the Resident Engineer.

3.9 SOUND TESTING

A. Perform and record required sound measurements in accordance with Paragraph, QUALITY ASSURANCE in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

1. Take readings in rooms, approximately twenty-five (25) percent of all rooms. The COR may designate the specific rooms to be tested.

B. Take measurements with a calibrated sound level meter and octave band analyzer of the accuracy required by AABC, TABB or NEBB.

C. Sound reference levels, formulas and coefficients shall be according to 2019 ASHRAE Handbook, "HVAC Applications", Chapter 49, SOUND AND VIBRATION CONTROL.

D. Determine compliance with specifications as follows:

1. When sound pressure levels are specified, including the NC Criteria in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT:

a. Reduce the background noise as much as possible by shutting off unrelated audible equipment.
b. Measure octave band sound pressure levels with specified equipment "off."
c. Measure octave band sound pressure levels with specified equipment "on."
d. Use the DIFFERENCE in corresponding readings to determine the sound pressure due to equipment.

DIFFERENCE:	0	1	2	3	4	5 to 9	10 or More
FACTOR:	10	7	4	3	2	1	0

Sound pressure level due to equipment equals sound pressure level with equipment "on" minus FACTOR.

e. Plot octave bands of sound pressure level due to equipment for typical rooms on a graph which also shows noise criteria (NC) curves.

2. When sound power levels are specified:
   a. Perform steps 1.a. thru 1.d., as above.
   b. For indoor equipment: Determine room attenuating effect, i.e., difference between sound power level and sound pressure level. Determined sound power level will be the sum of sound pressure level due to equipment plus the room attenuating effect.
   c. For outdoor equipment: Use directivity factor and distance from noise source to determine distance factor, i.e., difference between sound power level and sound pressure level. Measured sound power level will be the sum of sound pressure level due to equipment plus the distance factor. Use 13 meters (40 feet) for sound level location.
3. Where sound pressure levels are specified in terms of dB(A), measure sound levels using the "A" scale of meter. Single value readings will be used instead of octave band analysis.

E. Where measured sound levels exceed specified level, the installing contractor or equipment manufacturer shall take remedial action approved by the Resident Engineer and the necessary sound tests shall be repeated.

F. Test readings for sound testing could go higher than 15 percent if determination is made by the Resident Engineer based on the recorded sound data.

3.10 MARKING OF SETTINGS

A. Following approval of Tab final Report, the setting of all HVAC adjustment devices including valves, splitters and dampers shall be permanently marked by the TAB Specialist so that adjustment can be restored if disturbed at any time. Style and colors used for markings shall be coordinated with the Resident Engineer.

3.11 IDENTIFICATION OF TEST PORTS

A. The TAB Specialist shall permanently and legibly identify the location points of duct test ports. If the ductwork has exterior insulation, the identification shall be made on the exterior side of the insulation. All penetrations through ductwork and ductwork insulation shall be sealed to prevent air leaks and maintain integrity of vapor barrier.

3.12 PHASING

A. Phased Projects: Testing and Balancing Work to follow project with areas shall be completed per the project phasing. Upon completion of the project all areas shall have been tested and balanced per the contract documents.

B. Existing Areas: Systems that serve areas outside of the project scope shall not be adversely affected. Measure existing parameters where shown to document system capacity.

3.13 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.14 CRITICAL FLOW PATH

A. Provide a documented critical path for all fluid flows. There shall be at least one terminal device that can be traced back to the fan or pump where there is no damper or valves that are less than 100% open.

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SECTION 23 07 11
HVAC AND BOILER PLANT INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Field applied insulation for thermal efficiency and condensation control for
   1. HVAC piping, ductwork and equipment.

B. Definitions
   1. ASJ: All service jacket, white finish facing or jacket.
   2. Air-conditioned space: Space having air temperature and/or humidity controlled by mechanical equipment.
   3. Cold: Equipment, ductwork, or piping handling media at design temperature of 16 degrees C (60 degrees F) or below.
   4. Concealed: Ductwork and piping above ceilings and in chases, interstitial space, and pipe spaces.
   5. Exposed: Piping, ductwork, and equipment exposed to view in finished areas including mechanical and electrical equipment rooms or exposed to outdoor weather. Attics and crawl spaces where air handling units are located are mechanical rooms. Shafts, chases, interstitial spaces, unfinished attics, crawl spaces and pipe basements are not considered finished areas.
   6. FSK: Foil-scrim-kraft facing.
   7. Hot: HVAC Ductwork handling air at design temperature above 16 degrees C (60 degrees F);HVAC equipment or piping handling media above 41 degrees C (105 degrees F).
   8. Density: kg/m^3 - kilograms per cubic meter (Pcf - pounds per cubic foot).
   9. Runouts: Branch pipe connections up to 25-mm (one-inch) nominal size to fan coil units or reheat coils for terminal units.
   10. Thermal conductance: Heat flow rate through materials.
      a. Flat surface: Watt per square meter (BTU per hour per square foot).
      b. Pipe or Cylinder: Watt per square meter (BTU per hour per linear foot).
   11. Thermal Conductivity (k): Watt per meter, per degree C (BTU per inch thickness, per hour, per square foot, per degree F temperature difference).

12. Vapor Retarder (Vapor Barrier): A material which retards the transmission (migration) of water vapor. Performance of the vapor retarder is rated in terms of permeance (perms). For the purpose of this specification, vapor retarders shall have a maximum published permeance of 0.1 perms and vapor barriers shall have a maximum published permeance of 0.001 perms.
13. HPS: High pressure steam (415 kPa [60 psig] and above).
14. HPR: High pressure steam condensate return.
15. MPS: Medium pressure steam (110 kPa [16 psig] thru 414 kPa [59 psig].
16. MPR: Medium pressure steam condensate return.
17. LPS: Low pressure steam (103 kPa [15 psig] and below).
18. LPR: Low pressure steam condensate gravity return.
19. HW: Hot water.
20. RS: Refrigerant suction.
21. PVDC: Polyvinylidene chloride vapor retarder jacketing, white.

1.2 RELATED WORK

A Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Section 02 82 13. GLOVEBAG ASBESTOS ABATEMENT.

C. Section 07 84 00, FIRESTOPPING.

D. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

E. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

F. Section 23 22 13, STEAM and CONDENSATE HEATING PIPING

1.3 QUALITY ASSURANCE

A. Refer to article QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Criteria:

1. Comply with NFPA 90A, particularly paragraphs 4.3.3.1 through 4.3.3.6, 4.3.10.2.6, and 5.4.6.4, parts of which are quoted as follows:

> **4.3.3.1** Pipe insulation and coverings, duct coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and supplementary materials added to air ducts, plenums, panels, and duct silencers used in duct systems, unless otherwise provided for in 4.3.3.1.1 or 4.3.3.1.2., shall have, in the form in which they are used, a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*.

4.3.3.1.1 Where these products are to be applied with adhesives, they shall be tested with such adhesives applied, or the adhesives used shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when in the final dry state. *(See 4.2.4.2.)*

4.3.3.1.2 The flame spread and smoke developed index requirements of 4.3.3.1.1 shall not apply to air duct weatherproof coverings where they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.

4.3.3.2 Closure systems for use with rigid and flexible air ducts tested in accordance with UL 181, Standard for Safety Factory-Made Air Ducts and Air Connectors, shall have been tested, listed, and used in accordance with the conditions of their listings, in accordance with one of the following:

(1) UL 181A, Standard for Safety Closure Systems for Use with Rigid Air Ducts and Air Connectors

(2) UL 181B, Standard for Safety Closure Systems for Use with Flexible Air Ducts and Air Connectors

4.3.3.3 Air duct, panel, and plenum coverings and linings, and pipe insulation and coverings shall not flame, glow, smolder, or smoke when tested in accordance with a similar test for pipe covering, ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation, at the temperature to which they are exposed in service.

4.3.3.3.1 In no case shall the test temperature be below 121°C (250°F).

4.3.3.4 Air duct coverings shall not extend through walls or floors that are required to be fire stopped or required to have a fire resistance rating, unless such coverings meet the requirements of 5.4.6.4.

4.3.3.5* Air duct linings shall be interrupted at fire dampers to prevent interference with the operation of devices.

4.3.3.6 Air duct coverings shall not be installed to conceal or prevent the use of any service opening.

4.3.10.2.6 Materials exposed to the airflow shall be noncombustible or limited combustible and have a maximum smoke developed index of 50 or comply with the following.

4.3.10.2.6.1 Electrical wires and cables and optical fiber cables shall be listed as noncombustible or limited combustible and have a maximum smoke developed index of 50 or shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

4.3.10.2.6.2 Pneumatic tubing for control systems shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance

with UL 1820, Standard for Safety Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics.

4.3.10.2.6.4 Optical-fiber and communication raceways shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with UL 2024, Standard for Safety Optical-Fiber Cable Raceway.

4.3.10.2.6.6 Supplementary materials for air distribution systems shall be permitted when complying with the provisions of 4.3.3.

5.4.6.4 Where air ducts pass through walls, floors, or partitions that are required to have a fire resistance rating and where fire dampers are not required, the opening in the construction around the air duct shall be as follows:

(1) Not exceeding a 25.4 mm (1 in.) average clearance on all sides

(2) Filled solid with an approved material capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions required for fire barrier penetration as specified in NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials*

2. Test methods: ASTM E84, UL 723, or NFPA 255.
3. Specified k factors are at 24 degrees C (75 degrees F) mean temperature unless stated otherwise. Where optional thermal insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.
4. All materials shall be compatible and suitable for service temperature and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.

C. Every package or standard container of insulation or accessories delivered to the job site for use must have a manufacturer's stamp or label giving the name of the manufacturer and description of the material.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Shop Drawings:

1. All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM, federal and military specifications.
   a. Insulation materials: Specify each type used and state surface burning characteristics.
   b. Insulation facings and jackets: Each type used. Make it clear that white finish will be furnished for exposed ductwork, casings and equipment.
   c. Insulation accessory materials: Each type used.
   d. Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation.
   e. Refer to applicable specification paragraph numbers for coordination.

1.5 STORAGE AND HANDLING OF MATERIAL

Store materials in clean and dry environment, pipe covering jackets shall be clean and unmarred. Place adhesives in original containers. Maintain ambient temperatures and conditions as required by printed instructions of manufacturers of adhesives, mastics and finishing cements.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. Federal Specifications (Fed. Spec.):

L-P-535E (2)- 2012.....Plastic Sheet (Sheeting): Plastic Strip; Poly (Vinyl Chloride) and Poly (Vinyl Chloride - Vinyl Acetate), Rigid.

C. Military Specifications (Mil. Spec.):

MIL-A-3316C -1987 Adhesives, Fire-Resistant, Thermal Insulation

MIL-A-24179A (1)- 2016 Adhesive, Flexible Unicellular-Plastic Thermal Insulation

MIL-C-19565C (1)- 2016 Coating Compounds, Thermal Insulation, Fire-and Water-Resistant, Vapor-Barrier

MIL-C-20079H-1987.....Cloth, Glass; Tape, Textile Glass; and Thread, Glass and Wire-Reinforced Glass

D. American Society for Testing and Materials (ASTM):

B209-2014.....Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C411-2019.....Standard test method for Hot-Surface Performance of High-Temperature Thermal Insulation

C449-2019.....Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement

C533-2017.....Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation

C534-2017.....Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

C547-2017.....Standard Specification for Mineral Fiber pipe Insulation

C552-07.....Standard Specification for Cellular Glass Thermal Insulation

C553-2015.....Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

C585-2016.....Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System) R (1998)

C612-2014.....Standard Specification for Mineral Fiber Block and Board Thermal Insulation

C1126-2019.....Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation

C1136-2017.....Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

D1668-97a 2017 .....Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing

E84-2014.....Standard Test Method for Surface Burning Characteristics of Building Materials

E119-2007.....Standard Test Method for Fire Tests of Building Construction and Materials

E136-2019.....Standard Test Methods for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C (1380 F)

E. National Fire Protection Association (NFPA):

90A-2018.....Standard for the Installation of Air Conditioning and Ventilating Systems

96-2017.....Standard~~s~~ for Ventilation Control and Fire Protection of Commercial Cooking Operations

101-2018.....Life Safety Code

251-2014.....Standard methods of Tests of Fire Endurance of Building Construction Materials

255-2006.....Standard Method of tests of Surface Burning Characteristics of Building Materials

F. Underwriters Laboratories, Inc (UL):

723-2018.....UL Standard for Safety Test for Surface Burning Characteristics of Building Materials with Revision of 09/08

G. Manufacturer’s Standardization Society of the Valve and Fitting Industry (MSS):

SP58-2018.....Pipe Hangers and Supports Materials, Design, and Manufacture

PART 2 - PRODUCTS

2.1 MINERAL FIBER OR FIBER GLASS

A. ASTM C612 (Board, Block), Class 1 or 2, density 48 kg/m^3 (3 pcf), k = 0.037 (0.26) at 24 degrees C (75 degrees F), external insulation for temperatures up to 204 degrees C (400 degrees F) with foil scrim (FSK) facing.

B. ASTM C553 (Blanket, Flexible) Type I, Class B-3, Density 16 kg/m^3 (1 pcf), k = 0.045 (0.31) at 24 degrees C (75 degrees F), for use at temperatures up to 204 degrees C (400 degrees F) with foil scrim (FSK) facing.

C. ASTM C547 (Pipe Fitting Insulation and Preformed Pipe Insulation), Class 1, k = 0.037 (0.26) at 24 degrees C (75 degrees F), for use at temperatures up to 230 degrees C (450 degrees F) with an all service

vapor retarder jacket with polyvinyl chloride pre-molded fitting covering.

2.2 MINERAL WOOL OR REFRACTORY FIBER

A. Comply with Standard ASTM C612, Class 3, 450 degrees C (850 degrees F).

2.3 RIGID CELLULAR PHENOLIC FOAM

A. Preformed (molded) pipe insulation, ASTM C1126, type III, grade 1, k = 0.021(0.15) at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with all service vapor retarder jacket with polyvinyl chloride pre-molded fitting covering.

B. Equipment and Duct Insulation, ASTM C 1126, type II, grade 1, k = 0.021 (0.15) at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with rigid cellular phenolic insulation and covering, and all service vapor retarder jacket.

2.4 CELLULAR GLASS CLOSED-CELL

A. Comply with Standard ASTM C177, C518, density 120 kg/m^3 (7.5 pcf) nominal, k = 0.033 (0.29) at 24~~0~~ degrees C (75 degrees F).

B. Pipe insulation for use at temperatures up to 200 degrees C (400 degrees F) with all service vapor retarder jacket.

2.5 POLYISOCYANURATE CLOSED-CELL RIGID

A. Preformed (fabricated) pipe insulation, ASTM C591, type IV, K=0.027(0.19) at 24 degrees C (75 degrees F), flame spread not over 25, smoke developed not over 50, for use at temperatures up to 149 degree C (300 degree F) with factory applied PVDC or all service vapor retarder jacket with polyvinyl chloride pre-molded fitting covers.

B. Equipment and duct insulation, ASTM C 591,type IV, K=0.027(0.19) at 24 degrees C (75 degrees F), for use at temperatures up to 149 degrees C (300 degrees F) with PVDC or all service jacket vapor retarder jacket.

2.6 FLEXIBLE ELASTOMERIC CELLULAR THERMAL

ASTM C177, C518, k = 0.039 (0.27) at 24 degrees C (75 degrees F), flame spread not over 25, smoke developed not over 50, for temperatures from minus 4 degrees C (40 degrees F) to 93 degrees C (200 degrees F). No jacket required.

2.7 CALCIUM SILICATE

A. Preformed pipe Insulation: ASTM C533, Type I and Type II with indicator denoting asbestos-free material.

B. Pre-molded Pipe Fitting Insulation: ASTM C533, Type I and Type II with indicator denoting asbestos-free material.

C. Equipment Insulation: ASTM C533, Type I and Type II

D. Characteristics:

Insulation Characteristics

ITEMS	TYPE I	TYPE II
Temperature, maximum degrees C (degrees F)	649 (1200)	927 (1700)
Density (dry), Kg/m^3 (lb/ ft3)	232 (14.5)	288 (18)
Thermal conductivity: Min W/ m K (Btu in/h ft^2 degrees F)@ mean temperature of 93 degrees C (200 degrees F)	0.059 (0.41)	0.078 (0.540)
Surface burning characteristics: Flame spread Index, Maximum	0	0
Smoke Density index, Maximum	0	0

2.8 INSULATION FACINGS AND JACKETS

A. Vapor Retarder, higher strength with low water permeance = 0.02 or less perm rating, Beach puncture 50 units for insulation facing on exposed ductwork, casings and equipment, and for pipe insulation jackets. Facings and jackets shall be all service type (ASJ) or PVDC Vapor Retarder jacketing.

B. ASJ jacket shall be white kraft bonded to 0.025 mm (1 mil) thick aluminum foil, fiberglass reinforced, with pressure sensitive adhesive closure. Comply with ASTM C1136. Beach puncture 50 units, Suitable for painting without sizing. Jackets shall have minimum 40 mm (1-1/2 inch) lap on longitudinal joints and minimum 75 mm (3 inch) butt strip on end joints. Butt strip material shall be same as the jacket. Lap and butt strips shall be self-sealing type with factory-applied pressure sensitive adhesive.

C. Vapor Retarder medium strength with low water vapor permeance of 0.02 or less perm rating), Beach puncture 25 units: Foil-Scrim-Kraft (FSK) or PVDC vapor retarder jacketing type for concealed ductwork and equipment.

D. Field applied vapor barrier jackets shall be provided, in addition to the specified facings and jackets, on all exterior piping and ductwork

as well as on interior piping and ductwork exposed to outdoor air and conveying fluids below ambient temperature. The vapor barrier jacket shall consist of a multi-layer laminated cladding with a maximum water vapor permeance of 0.001 perms. The minimum puncture resistance shall be 35 cm-kg (30 inch-pounds) for interior locations and 92 cm-kg (80 inch-pounds) for exterior or exposed locations or where the insulation is subject to damage.

E. Glass Cloth Jackets: Pre-sized, minimum 0.18 kg per square meter (7.8 ounces per square yard), 2000 kPa (300 psig) bursting strength with integral vapor retarder where required or specified. Weather proof if utilized for outside service.

F. Factory composite materials may be used if they have been tested and certified by the manufacturer.

G. Pipe fitting insulation covering (jackets): Fitting covering shall be pre-molded to match shape of fitting and shall be polyvinyl chloride (PVC) conforming to Fed Spec L-P-335, composition A, Type II Grade GU, and Type III, minimum thickness 0.7 mm (0.03 inches). Provide color matching vapor retarder pressure sensitive tape.

H. Aluminum Jacket-Piping systems: ASTM B209, 3003 alloy, H-14 temper, 0.6 mm (0.023 inch) minimum thickness with locking longitudinal joints. Jackets for elbows, tees and other fittings shall be factory-fabricated to match shape of fitting and of 0.6 mm (0.024) inch minimum thickness aluminum. Fittings shall be of same construction as straight run jackets but need not be of the same alloy. Factory-fabricated stainless-steel bands shall be installed on all circumferential joints. Bands shall be 13 mm (0.5 inch) wide on 450 mm (18 inch) centers. System shall be weatherproof if utilized for outside service.

I. Aluminum jacket-Rectangular breeching: ASTM B209, 3003 alloy, H-14 temper, 0.5 mm (0.020 inches) thick with 32 mm (1-1/4 inch) corrugations or 0.8 mm (0.032 inches) thick with no corrugations. System shall be weatherproof if used for outside service.

2.9 PIPE COVERING PROTECTION SADDLES

A. Cold pipe support: Pre-molded pipe insulation 180 degrees (half-shells) on bottom half of pipe at supports. Material shall be cellular glass or high density Polyisocyanurate insulation of the same thickness as adjacent insulation. Density of Polyisocyanurate insulation shall be a minimum of 48 kg/m^3 (3.0 pcf).

Nominal Pipe Size and Accessories Material (Insert Blocks)	
Nominal Pipe Size mm (inches)	Insert Blocks mm (inches)
Up through 125 (5)	150 (6) long

B. Warm or hot pipe supports: Pre-molded pipe insulation (180-degree half-shells) on bottom half of pipe at supports. Material shall be high density Polyisocyanurate (for temperatures up to 149 degrees C [300 degrees F]), cellular glass or calcium silicate. Insulation at supports shall have same thickness as adjacent insulation. Density of Polyisocyanurate insulation shall be a minimum of 48 kg/m^3 (3.0 pcf).

2.10 ADHESIVE, MASTIC, CEMENT

A. Mil. Spec. MIL-A-3316, Class 1: Jacket and lap adhesive and protective finish coating for insulation.

B. Mil. Spec. MIL-A-3316, Class 2: Adhesive for laps and for adhering insulation to metal surfaces.

C. Mil. Spec. MIL-A-24179, Type II Class 1: Adhesive for installing flexible unicellular insulation and for laps and general use.

D. Mil. Spec. MIL-C-19565, Type I: Protective finish for outdoor use.

E. Mil. Spec. MIL-C-19565, Type I or Type II: Vapor barrier compound for indoor use.

F. ASTM C449: Mineral fiber hydraulic-setting thermal insulating and finishing cement.

G. Other: Insulation manufacturers' published recommendations.

2.11 MECHANICAL FASTENERS

A. Pins, anchors: Welded pins, or metal or nylon anchors with galvanized steel-coated or fiber washer, or clips. Pin diameter shall be as recommended by the insulation manufacturer.

B. Staples: Outward clinching galvanized steel.

C. Bands: 13 mm (0.5 inch) nominal width, brass, galvanized steel, aluminum, or stainless steel.

2.12 REINFORCEMENT AND FINISHES

A. Glass fabric, open weave: ASTM D1668, Type III (resin treated) and Type I (asphalt treated).

B. Glass fiber fitting tape: Mil. Spec MIL-C-20079, Type II, Class 1.

C. Tape for Flexible Elastomeric Cellular Insulation: As recommended by the insulation manufacturer.

D. Corner beads: 50 mm (2 inch) by 50 mm (2 inch), 0.55 mm thick (26 gage) galvanized steel; or, 25 mm (1 inch) by 25 mm (1 inch), 0.47 mm thick (28 gage) aluminum angle adhered to 50 mm (2 inch) by 50 mm (2 inch) Kraft paper.

E. PVC fitting cover: Fed. Spec L-P-535, Composition A, 11-86 Type II, Grade GU, with Form B Mineral Fiber insert, for media temperature 4 degrees C (40 degrees F) to 121 degrees C (250 degrees F). Below 4 degrees C (40 degrees F) and above 121 degrees C (250 degrees F). Provide double layer insert. Provide color matching vapor barrier pressure sensitive tape.

2.13 FIRESTOPPING MATERIAL

A. Other than pipe and duct insulation, refer to Section 07 84 00 FIRESTOPPING.

2.14 FLAME AND SMOKE

A. Unless shown otherwise all assembled systems shall meet flame spread 25 and smoke developed 50 rating as developed under ASTM, NFPA and UL standards and specifications. See paragraph 1.3 "Quality Assurance."

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Required pressure tests of duct and piping joints and connections shall be completed and the work approved by the Resident Engineer for application of insulation. Surface shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.

B. Except for specific exceptions, insulate entire specified equipment, piping (pipe, fittings, valves, accessories), and duct systems. Insulate each pipe and duct individually. Do not use scrap pieces of insulation where a full-length section will fit.

C. Where removal of insulation of piping, ductwork and equipment is required to comply with Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT, such areas shall be reinsulated to comply with this specification.

D. Insulation materials shall be installed in a first-class manner with smooth and even surfaces, with jackets and facings drawn tight and smoothly cemented down at all laps. Insulation shall be continuous through all sleeves and openings, except at fire dampers and duct heaters (NFPA 90A). Vapor retarders shall be continuous and

uninterrupted throughout systems with operating temperature 16 degrees C (60 degrees F) and below. Lap and seal vapor retarder over ends and exposed edges of insulation. Anchors, supports and other metal projections through insulation on cold surfaces shall be insulated and vapor sealed for a minimum length of 150 mm (6 inches).

E. Install vapor stops at all insulation terminations on either side of valves, pumps and equipment and particularly in straight lengths of pipe insulation.

F. Construct insulation on parts of equipment such as chilled water pumps and heads of chillers, convertors and heat exchangers that must be opened periodically for maintenance or repair, so insulation can be removed and replaced without damage. Install insulation with bolted 1 mm thick (20 gage) galvanized steel or aluminum covers as complete units, or in sections, with all necessary supports, and split to coincide with flange/split of the equipment.

G. Insulation on hot piping and equipment shall be terminated square at items not to be insulated, access openings and nameplates. Cover all exposed raw insulation with white sealer or jacket material.

H. Protect all insulations outside of buildings with aluminum jacket using lock joint or other approved system for a continuous weather tight system. Access doors and other items requiring maintenance or access shall be removable and sealable.

I. Insulate PRVs, flow meters, and steam traps.

J. HVAC work not to be insulated:

1. Internally insulated ductwork and air handling units.
2. Relief air ducts (Economizer cycle exhaust air).
3. Exhaust air ducts and plenums, and ventilation exhaust air shafts.
4. Equipment: Expansion tanks, flash tanks, hot water pumps.
5. In hot piping: Unions, flexible connectors, control valves, PRVs, safety valves and discharge vent piping, vacuum breakers, thermostatic vent valves, steam traps 20 mm (3/4 inch) and smaller, exposed piping through floor for convectors and radiators. Insulate piping to within approximately 75 mm (3 inches) of uninsulated items.

K. Apply insulation materials subject to the manufacturer's recommended temperature limits. Apply adhesives, mastic and coatings at the manufacturer's recommended minimum coverage.

L. Elbows, flanges, and other fittings shall be insulated with the same material as is used on the pipe straights. The elbow/fitting insulation shall be field-fabricated, mitered or factory prefabricated to the necessary size and shape to fit on the elbow/fitting. Use of polyurethane spray-foam to fill a PVC elbow jacket is prohibited on cold applications.

M. Firestop Pipe and Duct insulation:
   1. Provide firestopping insulation at fire and smoke barriers through penetrations. Fire stopping insulation shall be UL listed as defines in Section 07 84 00, FIRESTOPPING.
   2. Pipe and duct penetrations requiring fire stop insulation including, but not limited to the following:
      a. Pipe risers through floors
      b. Pipe or duct chase walls and floors
      c. Smoke partitions
      d. Fire partitions

N. Freeze protection of above grade outdoor piping (overheat tracing tape): 26 mm (10 inch) thick insulation, for all pipe sizes 75 mm(3 inches) and smaller and 25 mm(1inch) thick insulation for larger pipes. Provide metal jackets for all pipes. Provide for cold water make-up to cooling towers and condenser water piping and chilled water piping.

O. Provide vapor barrier jackets over insulation as follows:
   1. All piping and ductwork exposed to outdoor weather.
   2. All interior piping and ducts conveying fluids exposed to outdoor air (i.e. in attics, ventilated (not air conditioned) spaces, etc.) below ambient air temperature.

P. Provide metal jackets over insulation as follows:
   1. All piping and ducts exposed to outdoor weather.
   2. A 50 mm (2 inch) overlap is required at longitudinal and circumferential joints.

3.2 INSULATION INSTALLATION

A. Mineral Fiber Board:
   1. Faced board: Apply board on pins spaced not more than 300 mm (12 inches) on center each way, and not less than 75 mm (3 inches) from each edge of board. In addition to pins, apply insulation bonding adhesive to entire underside of horizontal metal surfaces. Butt insulation edges tightly and seal all joints with laps and butt

strips. After applying speed clips cut pins off flush and apply vapor seal patches over clips.

2. Plain board:
   a. Insulation shall be scored, beveled or mitered to provide tight joints and be secured to equipment with bands spaced 225 mm (9 inches) on center for irregular surfaces or with pins and clips on flat surfaces. Use corner beads to protect edges of insulation.
   b. For hot equipment: Stretch 25 mm (1 inch) mesh wire, with edges wire laced together, over insulation and finish with insulating and finishing cement applied in one coat, 6 mm (1/4 inch) thick, trowel led to a smooth finish.
   c. For cold equipment: Apply meshed glass fabric in a tack coat 1.5 to 1.7 square meter per liter (60 to 70 square feet per gallon) of vapor mastic and finish with mastic at 0.3 to 0.4 square meter per liter (12 to 15 square feet per gallon) over the entire fabric surface.
3. Exposed, unlined ductwork and equipment in unfinished areas, mechanical and electrical equipment rooms and attics, interstitial spaces, and duct work exposed to outdoor weather:
   a. 50 mm (2 inch) thick insulation faced with ASJ (white all service jacket): Supply air duct, unlined air handling units, and after filter housing.
   b. 50 mm (2 inch) thick insulation faced with ASJ: Return air duct, mixed air plenums and prefilter housing.
   c. Outside air intake ducts: 25 mm (one inch) thick insulation faced with ASJ.
   d. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a reinforcing membrane and two coats of vapor barrier mastic or multi-layer vapor barrier with a maximum water vapor permeability of 0.001 perms.

B. Flexible Mineral Fiber Blanket:
1. Adhere insulation to metal with 75 mm (3 inch) wide strips of insulation bonding adhesive at 200 mm (8 inches) on center all around duct. Additionally, secure insulation to bottom of ducts exceeding 600 mm (24 inches) in width with pins welded or adhered on

450 mm (18 inch) centers. Secure washers on pins. Butt insulation edges and seal joints with laps and butt strips. Staples may be used to assist in securing insulation. Seal all vapor retarder penetrations with mastic. Sagging duct insulation will not be acceptable. Install firestop duct insulation where required.

2. Supply air ductwork to be insulated includes main and branch ducts from AHU discharge to room supply outlets, and the bodies of ceiling outlets to prevent condensation. Insulate sound attenuator units, coil casings and damper frames. To prevent condensation, insulate trapeze type supports and angle iron hangers for flat oval ducts that are in direct contact with metal duct.
3. Concealed supply air ductwork.
   a. Above ceilings at a roof level, in attics, and duct work exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with FSK.
   b. Above ceilings for other than roof level: 40 mm (1 ½ inch) thick insulation faced with FSK.
4. Concealed return air duct:
   a. In attics (where not subject to damage) and where exposed to outdoor weather: 50mmm (2 inch) thick insulation faced with FSK,
   b. Above ceilings at a roof level, unconditioned areas, and in chases with external wall or containing steam piping; 40 mm (1-1/2 inch) thick, insulation faced with FSK.
   c. In interstitial spaces (where not subject to damage): 40 mm (1-1/2-inch-thick insulation faced with FSK.
   d. Concealed return air ductwork in other locations need not be insulated.
5. Concealed outside air duct: 40 mm (1-1/2 inch) thick insulation faced with FSK.
6. Exhaust air branch duct from autopsy refrigerator to main duct: 40 mm (1-1/2 inch) thick insulation faced with FSK.

C. Molded Mineral Fiber Pipe and Tubing Covering:
1. Fit insulation to pipe or duct, aligning longitudinal joints. Seal longitudinal joint laps and circumferential butt strips by rubbing hard with a nylon sealing tool to assure a positive seal. Staples may be used to assist in securing insulation. Seal all vapor retarder penetrations on cold piping with a generous application of

vapor barrier mastic. Provide inserts and install with metal insulation shields at outside pipe supports. Install freeze protection insulation over heating cable.

2. Contractor's options for fitting, flange and valve insulation:
   a. Insulating and finishing cement for sizes less than 100 mm (4 inches) operating at surface temperature of 16 degrees C (61 degrees F) or more.
   b. Factory Pre-molded, one-piece PVC covers with mineral fiber, (Form B), inserts. Provide two insert layers for pipe temperatures below 4 degrees C (40 degrees F), or above 121 degrees C (250 degrees F). Secure first layer of insulation with twine. Seal seam edges with vapor barrier mastic and secure with fitting tape.
   c. Factory molded, ASTM C547 or field mitered sections, joined with adhesive or wired in place. For hot piping finish with a smoothing coat of finishing cement. For cold fittings, 16 degrees C (60 degrees F) or less, vapor seal with a layer of glass fitting tape imbedded between two 2 mm (1/16 inch) coats of vapor barrier mastic.
   d. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 50 mm (2 inches).
3. Nominal thickness in millimeters and inches specified in the schedule at the end of this section.

D. Rigid Cellular Phenolic Foam:
1. Rigid closed cell phenolic insulation may be provided for piping, ductwork and equipment for temperatures up to 121 degrees C (250 degrees F).
2. Note the NFPA 90A burning characteristics requirements of 25/50 in paragraph 1.3.B
3. Provide secure attachment facilities such as welding pins.
4. Apply insulation with joints tightly drawn together
5. Apply adhesives, coverings, neatly finished at fittings, and valves.
6. Final installation shall be smooth, tight, neatly finished at all edges.
7. Minimum thickness in millimeters (inches) specified in the schedule at the end of this section.

8. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a multi-layer vapor barrier with a maximum water vapor permeance of 0.00 perms.
9. Condensation control insulation: Minimum 25 mm (1.0 inch) thick for all pipe sizes.
   a. HVAC: Cooling coil condensation piping to waste piping fixture or drain inlet. Omit insulation on plastic piping in mechanical rooms.

E. Cellular Glass Insulation:
1. Pipe and tubing, covering nominal thickness in millimeters and inches as specified in the schedule at the end of this section.
2. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a reinforcing membrane and two coats of vapor barrier mastic or multi-layer vapor barrier with a water vapor permeability of 0.00 perms.

F. Polyisocyanurate Closed-Cell Rigid Insulation:
1. Polyisocyanurate closed-cell rigid insulation (PIR) may be provided for exterior piping, equipment and ductwork for temperature up to 149 degree C (300-degree F).
2. Install insulation, vapor barrier and jacketing per manufacturer’s recommendations. Particular attention should be paid to recommendations for joint staggering, adhesive application, external hanger design, expansion/contraction joint design and spacing and vapor barrier integrity.
3. Install insulation with all joints tightly butted (except expansion) joints in hot applications).
4. If insulation thickness exceeds 63 mm (2.5 inches), install as a double layer system with longitudinal (lap) and butt joint staggering as recommended by manufacturer.
5. For cold applications, vapor barrier shall be installed in a continuous manner. No staples, rivets, screws or any other attachment device capable of penetrating the vapor barrier shall be used to attach the vapor barrier or jacketing. No wire ties capable of penetrating the vapor barrier shall be used to hold the insulation in place. Banding shall be used to attach PVC or metal jacketing.

6. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. The elbow/ fitting insulation shall be field-fabricated, mitered or factory prefabricated to the necessary size and shape to fit on the elbow/ fitting. Use of polyurethane spray-foam to fill PVC elbow jacket is prohibited on cold applications.
7. For cold applications, the vapor barrier on elbows/fittings shall be either mastic-fabric-mastic or 2 mil thick PVDC vapor barrier adhesive tape.
8. All PVC and metal jacketing shall be installed to naturally shed water. Joints shall point down and shall be sealed with either adhesive or caulking (except for periodic slip joints).
9. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a multi-layer vapor barrier with a water vapor permeance of 0.00 perms.
10. Note the NFPA 90A burning characteristic requirements of 25/50 in paragraph 1.3B. Refer to paragraph 3.1 for items not to be insulated.
11. Minimum thickness in millimeter (inches) specified in the schedule at the end of this section.

G. Flexible Elastomeric Cellular Thermal Insulation:
1. Apply insulation and fabricate fittings in accordance with the manufacturer's installation instructions and finish with two coats of weather resistant finish as recommended by the insulation manufacturer.
2. Pipe and tubing insulation:
   a. Use proper size material. Do not stretch or strain insulation.
   b. To avoid undue compression of insulation, provide cork stoppers or wood inserts at supports as recommended by the insulation manufacturer. Insulation shields are specified under Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
   c. Where possible, slip insulation over the pipe or tubing prior to connection, and seal the butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and apply it to the pipe sealing the seam and joints with contact adhesive. Optional tape sealing, as recommended by the manufacturer, may be

employed. Make changes from mineral fiber insulation in a straight run of pipe, not at a fitting. Seal joint with tape.

3. Apply sheet insulation to flat or large curved surfaces with 100 percent adhesive coverage. For fittings and large pipe, apply adhesive to seams only.
4. Pipe insulation: nominal thickness in millimeters (inches as specified in the schedule at the end of this section.
5. Minimum 20 mm (0.75 inch) thick insulation for pneumatic control lines for a minimum distance of 6 m (20 feet) from discharge side of the refrigerated dryer.
7. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a multi-layer vapor barrier with a water vapor permeance of 0.00 perms.

H. Calcium Silicate:

1. Minimum thickness in millimeter (inches) specified in the schedule at the end of this section for piping other than in boiler plant.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.4 PIPE INSULATION SCHEDULE

Provide insulation for piping systems as scheduled below:

Insulation Wall Thickness Millimeters (Inches)					
		Nominal Pipe Size Millimeters (Inches)			
Operating Temperature Range/Service	Insulation Material	Less than 25 (1)	25 – 32 (1 – 1¼)	38 – 75 (1½ - 3)	100 (4) and Above
	Insulation Wall Thickness Millimeters (Inches)				
122-177 degrees C (251-350 degrees F) (HPS, MPS)	Mineral Fiber (Above ground piping only)	75 (3)	100 (4)	113 (4.5)	113 (4.5)

93-260 degrees C (200-500 degrees F) (HPS, HPR)	Calcium Silicate	100 (4)	125 (5)	150 (6)	150 (6)
100-121 degrees C (212-250 degrees F) (HPR, MPR, LPS, vent piping from PRV Safety Valves, Condensate receivers and flash tanks)	Mineral Fiber (Above ground piping only)	62 (2.5)	62 (2.5)	75 (3.0)	75 (3.0)
100-121 degrees C (212-250 degrees F) (HPR, MPR, LPS, vent piping from PRV Safety Valves, Condensate receivers and flash tanks)	Rigid Cellular Phenolic Foam	50 (2.0)	50 (2.0)	75 (3.0)	75 (3.0)
38-94 degrees C (100-200 degrees F) (LPR, PC, HWH, HWHR, GH and GHR)	Mineral Fiber (Above ground piping only)	38 (1.5)	38 (1.5)	50 (2.0)	50 (2.0)
38-99 degrees C (100-211 degrees F) (LPR, PC, HWH, HWHR, GH and GHR)	Rigid Cellular Phenolic Foam	38 (1.5)	38 (1.5)	50 (2.0)	50 (2.0)
39-99 degrees C (100-211 degrees F) (LPR, PC, HWH, HWHR, GH and GHR)	Polyiso-cyanurate Closed-Cell Rigid (Exterior Locations only)	38 (1.5)	38 (1.5)	----	----
38-94 degrees C (100-200 degrees F) (LPR, PC, HWH, HWHR, GH and GHR)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	38 (1.5)	38 (1.5)	----	----
4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Rigid Cellular Phenolic Foam	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)

4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Cellular Glass Closed-Cell	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Polyiso-cyanurate Closed-Cell Rigid (Exterior Locations only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
(40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)

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SECTION 23 08 00
COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 23.

B. This project will have selected building systems commissioned. A Commissioning Agent (CxA) appointed by the VA will manage the commissioning process.

1.2 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 33 00 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 23 05 41 NOISE AND VIBRATION CONTROL for HVAC PIPING AND EQUIPMENT.

D. Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.

E. Section 23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

1.3 SUMMARY

A. This Section includes requirements for commissioning the HVAC systems of the related subsystems and equipment.

1.4 COMMISSIONED SYSTEMS

A. Commissioning of a system or systems specified in Division 23 is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel in accordance with the requirements of Division 23, is required in cooperation with the VA and the Commissioning Agent.

B. The Facility HVAC systems commissioning will include all new and upgraded HVAC systems and controls.

1.5 SUBMITTALS

A. The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.

B. The commissioning process requires Submittal review simultaneously with engineering review.

1.6 APPLICABLE PUBLICATIONS

A. The following publications form a part of this specification to the extent indicated by the reference thereto. In text the publications are referenced to by the acronym of the organization.

B. Department of Veterans Affairs (VA):

PG 18-10 2015.....Mission Critical Facilities - DRAFT

PG 18-10 2015.....Life-Safety Protected Facilities - DRAFT

C. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):

HANDBOOK 2019.....HVAC Applications ASHRAE Handbook, Chapter 39, Testing, Adjusting, and Balancing, Chapter 44, HVAC Commissioning and Chapter 49, Sound and Vibration Control

HANDBOOK 2017.....HVAC Fundamentals ASHRAE Handbook, Chapter 8, Sound and Vibration

D. Associated Air Balance Council (AABC):

7th Edition 2016.....AABC National Standards for Total System Balance

E. National Environmental Balancing Bureau (NEBB):

9th Edition 2019.....Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems

3rd Edition 2018 .....Procedural Standards for the Measurement of Sound and Vibration

2nd Edition 2019 ... Standard for Whole Building Technical Commissioning of New Construction

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

006 2006.....HVAC Duct Construction Standard – Metal and Flexible Duct

3rd Edition 2005 ... HVAC Systems Testing, Adjusting and Balancing

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION INSPECTIONS

A. Commissioning of HVAC systems will require inspection of individual elements of the HVAC systems construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent

in accordance with the Commissioning plan to schedule HVAC systems inspections as required to support the Commissioning Process.

3.2 PRE-FUNCTIONAL CHECKLISTS

A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. Refer to Sections 23 05 41 NOISE AND VIBRATION CONTROL for HVAC PIPING AND EQUIPMENT, Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC and Section 23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC requirements. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission.

3.3 CONTRACTOR'S TESTS

A. Contractor tests as required by other sections of Division 23 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:

A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in

operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed.

3.5 TRAINING OF VA PERSONNEL

A. Training of the VA operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the Commissioning Plan. The instruction shall be scheduled in coordination with the VA COR after submission and approval of formal training plans. Refer to Division 23 Sections for additional Contractor training requirements.

---END---

SECTION 23 09 23
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide (a) direct-digital control system(s) as indicated on the project documents, point list, interoperability tables, drawings and as described in these specifications. Include a complete and working direct-digital control system. Include all engineering, programming, controls and installation materials, installation labor, commissioning and start-up, training, final project documentation and warranty.

1. The direct-digital control system(s) shall consist of high-speed, peer-to-peer network of DDC controllers, a control system server, and an Engineering Control Center. Provide a remote user using a standard web browser to access the control system graphics and change adjustable setpoints with the proper password.
2. The direct-digital control system(s) shall be native BACnet. All new workstations, controllers, devices, and components shall be listed by BACnet Testing Laboratories. All new workstations, controller, devices and components shall be accessible using a Web browser interface and shall communicate exclusively using the ASHRAE Standard 135 BACnet communications protocol without the use of gateways, unless otherwise allowed by this Section of the technical specifications, specifically shown on the design drawings and specifically requested otherwise by the VA.
   a. If used, gateways shall support the ASHRAE Standard 135 BACnet communications protocol.
   b. If used, gateways shall provide all object properties and read/write services shown on VA-approved interoperability schedules.
3. The work administered by this Section of the technical specifications shall include all labor, materials, special tools, equipment, enclosures, power supplies, software, software licenses, Project specific software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, submittals, testing, verification, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, Warranty,

specified services and items required for complete and fully functional Controls Systems.

4. The control systems shall be designed such that each mechanical system shall operate under stand-alone mode. The contractor administered by this Section of the technical specifications shall provide controllers for each mechanical system. In the event of a network communication failure, or the loss of any other controller, the control system shall continue to operate independently. Failure of the ECC shall have no effect on the field controllers, including those involved with global strategies.
5. The control system shall accommodate 1 Engineering Control Center and the control system shall accommodate 5 web-based Users simultaneously, and the access to the system should be limited only by operator password.

B. Some products are furnished but not installed by the contractor administered by this Section of the technical specifications. The contractor administered by this Section of the technical specifications shall formally coordinate in writing and receive from other contractor’s formal acknowledgements in writing prior to submission the installation of the products. These products include the following:
   1. Control valves.
   2. Flow switches.
   3. Flow meters.
   4. Sensor wells and sockets in piping.
   5. Terminal unit controllers.

C. Some products are installed but not furnished by the contractor administered by this Section of the technical specifications. The contractor administered by this Section of the technical specifications shall formally coordinate in writing and receive from other contractor’s formal acknowledgements in writing prior to submission the procurement of the products. These products include the following:
   1. Refrigerant leak detection system.
   2. Factory-furnished accessory thermostats and sensors furnished with unitary equipment.

D. Some products are not provided by, but are nevertheless integrated with the work executed by, the contractor administered by this Section of the technical specifications. The contractor administered by this

Section of the technical specifications shall formally coordinate in writing and receive from other contractor's formal acknowledgements in writing prior to submission the particulars of the products. These products include the following:

1. Fire alarm systems. If zoned fire alarm is required by the project-specific requirements, this interface shall require multiple relays, which are provided and installed by the fire alarm system contractor, to be monitored.
2. Unitary HVAC equipment (rooftop air conditioning units, split systems) controls. These include:
   a. Discharge temperature control.
   b. Economizer control.
   c. Flowrate control.
   d. Setpoint reset.
   e. Time of day indexing.
   f. Status alarm.
3. The following systems have limited control (as individually noted below) from the ECC:
   a. Pneumatic tube systems: status alarms.
   b. Elevators: status alarms.

E. Responsibility Table:

Work/Item/System	**Furnish**	**Install**	**Low Voltage Wiring**	**Line Power**
Control system low voltage and communication wiring	23 09 23	23 09 23	23 09 23	N/A
Terminal units	23	23	N/A	26
Controllers for terminal units	23 09 23	23	23 09 23	16
LAN conduits and raceway	23 09 23	23 09 23	N/A	N/A
Automatic dampers (not furnished with equipment)	23 09 23	23	N/A	N/A
Automatic damper actuators	23 09 23	23 09 23	23 09 23	23 09 23
Manual valves	23	23	N/A	N/A
Automatic valves	23 09 23	23	23 09 23	23 09 23
Pipe insertion devices and taps, flow and pressure stations.	23	23	N/A	N/A

Work/Item/System	**Furnish**	**Install**	**Low Voltage Wiring**	**Line Power**
Thermowells	23 09 23	23	N/A	N/A
Current Switches	23 09 23	23 09 23	23 09 23	N/A
Control Relays	23 09 23	23 09 23	23 09 23	N/A
Power distribution system monitoring interfaces	23 09 23	23 09 23	23 09 23	26
All control system nodes, equipment, housings, enclosures and panels.	23 09 23	23 09 23	23 09 23	26
Smoke detectors	28 31 00	28 31 00	28 31 00	28 31 00
Fire/Smoke Dampers	23	23	28 31 00	28 31 00
Smoke Dampers	23	23	28 31 00	28 31 00
Fire Dampers	23	23	N/A	N/A
Refrigerant monitors	23	23 09 23	23 09 23	26
Fire Alarm shutdown relay interlock wiring	28	28	28	26
Control system monitoring of fire alarm smoke control relay	28	28	23 09 23	28
Fire-fighter’s smoke control station (FSCS	28	28	28	28
Unit Heater controls (not furnished with equipment)	23 09 23	23 09 23	23 09 23	26
Packaged RTU space-mounted controls (not furnished with equipment)	23 09 23	23 09 23	23 09 23	26
Packaged RTU unit-mounted controls (not furnished with equipment)	23 09 23	23 09 23	23 09 23	26
Starters, HOA switches	23	23	N/A	26

F. This facility's existing direct-digital control system is manufactured by Automated Logic, and its ECC is located at B-5 and B-43. The existing system's top-end communications is via BACnet. The existing system's ECC and top-end controllers were installed in B-5 (HVAC Shop) and B-43 (Energy Plant). The contractor administered by this Section of the technical specifications shall observe the capabilities, communication network, services, spare capacity of the existing control system and its ECC prior to beginning work.

G. Unitary standalone systems including Unit Heaters, Cabinet Unit Heaters, Fan Coil Units, Base Board Heaters, thermal comfort ventilation fans, and similar units for control of room environment conditions may be equipped with integral controls furnished and installed by the equipment manufacturer or field mounted. Refer to equipment specifications and as indicated in project documents. Application of standalone unitary controls is limited to at least those systems wherein remote monitoring, alarm and start-up are not necessary. Examples of such systems include:
   1. Mechanical or electrical room heating and ventilation.

H. The direct-digital control system shall start and stop equipment, move (position) damper actuators and valve actuators, and vary speed of equipment to execute the mission of the control system. Use electricity as the motive force for all damper and valve actuators, unless use of pneumatics as motive force is specifically granted by the VA.

1.2 RELATED WORK

A. Section 14 12 11, Electric Dumbwaiters (Drum Type).
B. Section 22 14 29, Sump Pumps.
C. Section 23 22 13, Steam and Condensate Heating Piping.
D. Section 23 31 00, HVAC Ducts and Casings.
E. Section 23 36 00, Air Terminal Units.
F. Section 23 73 00, Indoor Central-Station Air-Handling Units.
G. Section 23 81 00, Decentralized Unitary HVAC Equipment.
H. Section 26 05 11, Requirements for Electrical Installations.
I. Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables (600 Volts and Below).
J. Section 26 05 26, Grounding and Bonding for Electrical Systems.
K. Section 26 05 33, Raceway and Boxes for Electrical Systems.

L. Section 26 27 26, Wiring Devices.

M. Section 26 29 11, Motor Controllers.

1.2 DEFINITION

A. Algorithm: A logical procedure for solving a recurrent mathematical problem; A prescribed set of well-defined rules or processes for the solution of a problem in a finite number of steps.

B. ARCNET: ANSI/ATA 878.1 - Attached Resource Computer Network. ARCNET is a deterministic LAN technology; meaning it's possible to determine the maximum delay before a device is able to transmit a message.

C. Analog: A continuously varying signal value (e.g., temperature, current, velocity etc.

D. BACnet: A Data Communication Protocol for Building Automation and Control Networks, ANSI/ASHRAE Standard 135. This communications protocol allows diverse building automation devices to communicate data over and services over a network.

E. BACnet/IP: Annex J of Standard 135. It defines and allows for using a reserved UDP socket to transmit BACnet messages over IP networks. A BACnet/IP network is a collection of one or more IP sub-networks that share the same BACnet network number.

F. BACnet Internetwork: Two or more BACnet networks connected with routers. The two networks may sue different LAN technologies.

G. BACnet Network: One or more BACnet segments that have the same network address and are interconnected by bridges at the physical and data link layers.

H. BACnet Segment: One or more physical segments of BACnet devices on a BACnet network, connected at the physical layer by repeaters.

I. BACnet Broadcast Management Device (BBMD): A communications device which broadcasts BACnet messages to all BACnet/IP devices and other BBMDs connected to the same BACnet/IP network.

J. BACnet Interoperability Building Blocks (BIBBs): BACnet Interoperability Building Blocks (BIBBs) are collections of one or more BACnet services. These are prescribed in terms of an "A" and a "B" device. Both of these devices are nodes on a BACnet internetwork.

K. BACnet Testing Laboratories (BTL). The organization responsible for testing products for compliance with the BACnet standard, operated under the direction of BACnet International.

L. Baud: It is a signal change in a communication link. One signal change can represent one or more bits of information depending on type of transmission scheme. Simple peripheral communication is normally one bit per Baud. (e.g., Baud rate = 78,000 Baud/sec is 78,000 bits/sec, if one signal change = 1 bit).

M. Binary: A two-state system where a high signal level represents an "ON" condition and an "OFF" condition is represented by a low signal level.

N. BMP or bmp: Suffix, computerized image file, used after the period in a DOS-based computer file to show that the file is an image stored as a series of pixels.

O. Bus Topology: A network topology that physically interconnects workstations and network devices in parallel on a network segment.

P. Control Unit (CU): Generic term for any controlling unit, stand-alone, microprocessor based, digital controller residing on secondary LAN or Primary LAN, used for local controls or global controls

Q. Deadband: A temperature range over which no heating or cooling is supplied, i.e., 22-25 degrees C (72-78 degrees F), as opposed to a single point change over or overlap).

R. Device: a control system component that contains a BACnet Device Object and uses BACnet to communicate with other devices.

S. Device Object: Every BACnet device requires one Device Object, whose properties represent the network visible properties of that device. Every Device Object requires a unique Object Identifier number on the BACnet internetwork. This number is often referred to as the device instance.

T. Device Profile: A specific group of services describing BACnet capabilities of a device, as defined in ASHRAE Standard 135-2008, Annex L. Standard device profiles include BACnet Operator Workstations (B-OWS), BACnet Building Controllers (B-BC), BACnet Advanced Application Controllers (B-AAC), BACnet Application Specific Controllers (B-ASC), BACnet Smart Actuator (B-SA), and BACnet Smart Sensor (B-SS). Each device used in new construction is required to have a PICS statement listing which service and BIBBs are supported by the device.

U. Diagnostic Program: A software test program, which is used to detect and report system or peripheral malfunctions and failures. Generally, this system is performed at the initial startup of the system.

V. Direct Digital Control (DDC): Microprocessor based control including Analog/Digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices in order to achieve a set of predefined conditions.

W. Distributed Control System: A system in which the processing of system data is decentralized, and control decisions can and are made at the subsystem level. System operational programs and information are provided to the remote subsystems and status is reported back to the Engineering Control Center. Upon the loss of communication with the Engineering Control center, the subsystems shall be capable of operating in a stand-alone mode using the last best available data.

X. Download: The electronic transfer of programs and data files from a central computer or operation workstation with secondary memory devices to remote computers in a network (distributed) system.

Y. DXF: An AutoCAD 2-D graphics file format. Many CAD systems import and export the DXF format for graphics interchange.

Z. Electrical Control: A control circuit that operates on line or low voltage and uses a mechanical means, such as a temperature sensitive bimetal or bellows, to perform control functions, such as actuating a switch or positioning a potentiometer.

AA. Electronic Control: A control circuit that operates on low voltage and uses solid-state components to amplify input signals and perform control functions, such as operating a relay or providing an output signal to position an actuator.

BB. Engineering Control Center (ECC): The centralized control point for the intelligent control network. The ECC comprises of personal computer and connected devices to form a single workstation.

CC. Ethernet: A trademark for a system for exchanging messages between computers on a local area network using coaxial, fiber optic, or twisted-pair cables.

DD. Firmware: Firmware is software programmed into read only memory (ROM) chips. Software may not be changed without physically altering the chip.

EE. Gateway: Communication hardware connecting two or more different protocols. It translates one protocol into equivalent concepts for the

other protocol. In BACnet applications, a gateway has BACnet on one side and non-BACnet (usually proprietary) protocols on the other side.

FF. GIF: Abbreviation of Graphic interchange format.

GG. Graphic Program (GP): Program used to produce images of air handler systems, fans, chillers, pumps, and building spaces. These images can be animated and/or color-coded to indicate operation of the equipment.

HH. Graphic Sequence of Operation: It is a graphical representation of the sequence of operation, showing all inputs and output logical blocks.

II. I/O Unit: The section of a digital control system through which information is received and transmitted. I/O refers to analog input (AI, digital input (DI), analog output (AO) and digital output (DO). Analog signals are continuous and represent temperature, pressure, flow rate etc, whereas digital signals convert electronic signals to digital pulses (values), represent motor status, filter status, on-off equipment etc.

JJ. I/P: a method for conveying and routing packets of information over LAN paths. User Datagram Protocol (UDP) conveys information to “sockets” without confirmation of receipt. Transmission Control Protocol (TCP) establishes "sessions", which have end-to-end confirmation and guaranteed sequence of delivery.

KK. JPEG: A standardized image compression mechanism stands for Joint Photographic Experts Group, the original name of the committee that wrote the standard.

LL. Local Area Network (LAN): A communication bus that interconnects operator workstation and digital controllers for peer-to-peer communications, sharing resources and exchanging information.

MM. Network Repeater: A device that receives data packet from one network and rebroadcasts to another network. No routing information is added to the protocol.

NN. MS/TP: Master-slave/token-passing (ISO/IEC 8802, Part 3). It is not an acceptable LAN option for VA health-care facilities. It uses twisted-pair wiring for relatively low speed and low-cost communication.

OO. Native BACnet Device: A device that uses BACnet as its primary method of communication with other BACnet devices without intermediary gateways. A system that uses native BACnet devices at all levels is a native BACnet system.

PP. Network Number: A site-specific number assigned to each network segment to identify for routing. This network number must be unique throughout the BACnet internetwork.

QQ. Object: The concept of organizing BACnet information into standard components with various associated properties. Examples include analog input objects and binary output objects.

RR. Object Identifier: An object property used to identify the object, including object type and instance. Object Identifiers must be unique within a device.

SS. Object Properties: Attributes of an object. Examples include present value and high limit properties of an analog input object. Properties are defined in ASHRAE 135; some are optional, and some are required. Objects are controlled by reading from and writing to object properties.

TT. Operating system (OS): Software, which controls the execution of computer application programs.

UU. PCX: File type for an image file. When photographs are scanned onto a personal computer they can be saved as PCX files and viewed or changed by a special application program as Photo Shop.

VV. Peripheral: Different components that make the control system function as one unit. Peripherals include monitor, printer, and I/O unit.

WW. Peer-to-Peer: A networking architecture that treats all network stations as equal partners- any device can initiate and respond to communication with other devices.

XX. PICS: Protocol Implementation Conformance Statement, describing the BACnet capabilities of a device. All BACnet devices have published PICS.

YY. PID: Proportional, integral, and derivative control, used to control modulating equipment to maintain a setpoint.

ZZ. Repeater: A network component that connects two or more physical segments at the physical layer.

AAA. Router: a component that joins together two or more networks using different LAN technologies. Examples include joining a BACnet Ethernet LAN to a BACnet MS/TP LAN.

BBB. Sensors: devices measuring state points or flows, which are then transmitted back to the DDC system.

CCC. Thermostats: devices measuring temperatures, which are used in control of standalone or unitary systems and equipment not attached to the DDC system.

1.4 QUALITY ASSURANCE

A. Criteria:

1. Single Source Responsibility of subcontractor: The Contractor shall obtain hardware and software supplied under this Section and delegate the responsibility to a single source controls installation subcontractor. The controls subcontractor shall be responsible for the complete design, installation, and commissioning of the system. The controls subcontractor shall be in the business of design, installation, and service of such building automation control systems similar in size and complexity.
2. Equipment and Materials: Equipment and materials shall be cataloged products of manufacturers regularly engaged in production and installation of HVAC control systems. Products shall be manufacturer’s latest standard design and have been tested and proven in actual use.
3. The controls subcontractor shall provide a list of no less than five similar projects which have building control systems as specified in this Section. These projects must be on-line and functional such that the Department of Veterans Affairs (VA) representative would observe the control systems in full operation.
4. The controls subcontractor shall have in-place facility within 50 miles with technical staff, spare parts inventory for the next five (5) years, and necessary test and diagnostic equipment to support the control systems.
5. The controls subcontractor shall have minimum of three years’ experience in design and installation of building automation systems similar in performance to those specified in this Section. Provide evidence of experience by submitting resumes of the project manager, the local branch manager, project engineer, the application engineering staff, and the electronic technicians who would be involved with the supervision, the engineering, and the installation of the control systems. Training and experience of these personnel shall not be less than three years. Failure to disclose this information will be a ground for disqualification of the supplier.

6. Provide a competent and experienced Project Manager employed by the Controls Contractor. The Project Manager shall be supported as necessary by other Contractor employees in order to provide professional engineering, technical and management service for the work. The Project Manager shall attend scheduled Project Meetings as required and shall be empowered to make technical, scheduling and related decisions on behalf of the Controls Contractor.

B. Codes and Standards:

1. All work shall conform to the applicable Codes and Standards.
2. Electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference, and be so labeled.

1.5 PERFORMANCE

A. The system shall conform to the following:

1. Graphic Display: The system shall display up to four (4) graphics on a single screen with a minimum of twenty (20) dynamic points per graphic. All current data shall be displayed within ten (10) seconds of the request.
2. Graphic Refresh: The system shall update all dynamic points with current data within eight (8) seconds. Data refresh shall be automatic, without operator intervention.
3. Object Command: The maximum time between the command of a binary object by the operator and the reaction by the device shall be two (2) seconds. Analog objects shall start to adjust within two (2) seconds.
4. Object Scan: All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or work-station will be current, within the prior six (6) seconds.
5. Alarm Response Time: The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed (10) seconds.
6. Program Execution Frequency: Custom and standard applications shall be capable of running as often as once every (5) seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.

7. Multiple Alarm Annunciations: All workstations on the network shall receive alarms within five (5) seconds of each other.
8. Performance: Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every one (1) second. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
9. Reporting Accuracy: Listed below are minimum acceptable reporting end-to-end accuracies for all values reported by the specified system:

Measured Variable	**Reported Accuracy**
Space temperature	±0.5°C (±1°F)
Ducted air temperature	±0.5°C [±1°F]
Outdoor air temperature	±1.0°C [±2°F]
Dew Point	±1.5°C [±3°F]
Water temperature	±0.5°C [±1°F]
Relative humidity	±2% RH
Water flow	±1% of reading
Air flow (terminal)	±10% of reading
Air flow (measuring stations)	±5% of reading
Air pressure (ducts)	±25 Pa [±0.1"w.c.]
Air pressure (space)	±0.3 Pa [±0.001"w.c.]
Water pressure	±2% of full scale *Note 1
Electrical Power	±0.5% of reading

Note 1: for both absolute and differential pressure

10. Control stability and accuracy: Control sequences shall maintain measured variable at setpoint within the following tolerances:

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.)	0–1.5 kPa (0–6 in. w.g.)
Air Pressure	±3 Pa (±0.01 in. w.g.)	-25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0°C (±2.0°F)	
Duct Temperature	±1.5°C (±3°F)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi)	0–1 MPa (1–150 psi)
Fluid Pressure	±250 Pa (±1.0 in. w.g.)	0–12.5 kPa (0–50 in. w.g.) differential

11. Extent of direct digital control: control design shall allow for at least the points indicated on the points lists on the drawings.

1.6 WARRANTY

A. Labor and materials for control systems shall be warranted for a period as specified under Warranty in FAR clause 52.246-21.

B. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no cost or reduction in service to the owner. The system includes all computer equipment, transmission equipment, and all sensors and control devices.

C. The on-line support service shall allow the Controls supplier to dial out over telephone lines to or connect via (through password-limited access) VPN through the internet monitor and control the facility's building automation system. This remote connection to the facility shall be within two (2) hours of the time that the problem is reported. This coverage shall be extended to include normal business hours, after business hours, weekend, and holidays. If the problem cannot be resolved with on-line support services, the Controls supplier shall dispatch the qualified personnel to the job site to resolve the problem within 24 hours after the problem is reported.

D. Controls and Instrumentation subcontractor shall be responsible for temporary operations and maintenance of the control systems during the

construction period until final commissioning, training of facility operators and acceptance of the project by VA.

1.7 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's literature and data for all components including the following:

1. A wiring diagram for each type of input device and output device including DDC controllers, modems, repeaters, etc. Diagram shall show how the device is wired and powered, showing typical connections at the digital controllers and each power supply, as well as the device itself. Show for all field connected devices, including but not limited to, control relays, motor starters, electric or electronic actuators, and temperature pressure, flow and humidity sensors and transmitters.
2. A diagram of each terminal strip, including digital controller terminal strips, terminal strip location, termination numbers and the associated point names.
3. Control dampers and control valves schedule, including the size and pressure drop.
4. Control air-supply components, and computations for sizing compressors, receivers and main air-piping, if pneumatic controls are furnished.
5. Catalog cut sheets of all equipment used. This includes, but is not limited to, software (by manufacturer and by third parties), DDC controllers, panels, peripherals, airflow measuring stations and associated components, and auxiliary control devices such as sensors, actuators, and control dampers. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted. Each submitted piece of literature and drawings should clearly reference the specification and/or drawings that it supposed to represent.
6. Sequence of operations for each HVAC system and the associated control diagrams. Equipment and control labels shall correspond to those shown on the drawings.
7. Color prints of proposed graphics with a list of points for display.

8. Furnish a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet-compliant device.
9. Schematic wiring diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show all interface wiring to the control system.
10. An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number.
11. Riser diagrams of wiring between central control unit and all control panels.
12. Scaled plan drawings showing routing of LAN and locations of control panels, controllers, routers, gateways, ECC, and larger controlled devices.
13. Construction details for all installed conduit, cabling, raceway, cabinets, and similar. Construction details of all penetrations and their protection.
14. Quantities of submitted items may be reviewed but are the responsibility of the contractor administered by this Section of the technical specifications.

C. Product Certificates: Compliance with Article, QUALITY ASSURANCE.

D. Licenses: Provide licenses for all software residing on and used by the Controls Systems and transfer these licenses to the Owner prior to completion.

E. As Built Control Drawings:
1. Furnish three (3) copies of as-built drawings for each control system. The documents shall be submitted for approval prior to final completion.
2. Furnish one (1) stick set of applicable control system prints for each mechanical system for wall mounting. The documents shall be submitted for approval prior to final completion.
3. Furnish one (1) CD-ROM in CAD DWG and/or .DXF format for the drawings noted in subparagraphs above.

F. Operation and Maintenance (O/M) Manuals):

1. Submit in accordance with Article, INSTRUCTIONS, in Specification Section 01 00 00, GENERAL REQUIREMENTS.
2. Include the following documentation:
   a. General description and specifications for all components, including logging on/off, alarm handling, producing trend reports, overriding computer control, and changing set points and other variables.
   b. Detailed illustrations of all the control systems specified for ease of maintenance and repair/replacement procedures, and complete calibration procedures.
   c. One copy of the final version of all software provided including operating systems, programming language, operator workstation software, and graphics software.
   d. Complete troubleshooting procedures and guidelines for all systems.
   e. Complete operating instructions for all systems.
   f. Recommended preventive maintenance procedures for all system components including a schedule of tasks for inspection, cleaning and calibration. Provide a list of recommended spare parts needed to minimize downtime.
   g. Training Manuals: Submit the course outline and training material to the Owner for approval three (3) weeks prior to the training to VA facility personnel. These persons will be responsible for maintaining and the operation of the control systems, including programming. The Owner reserves the right to modify any or all of the course outline and training material.
   h. Licenses, guaranty, and other pertaining documents for all equipment and systems.

G. Submit Performance Report to COR prior to final inspection.

1.8 INSTRUCTIONS

A. Instructions to VA operations personnel: Perform in accordance with Article, INSTRUCTIONS, in Specification Section 01 00 00, GENERAL REQUIREMENTS, and as noted below.
   1. First Phase: Formal instructions to the VA facilities personnel for a total of 16 hours, given in multiple training sessions (each no longer than four hours in length), conducted sometime between the completed installation and prior to the performance test period of

the control system, at a time mutually agreeable to the Contractor and the VA.

2. Second Phase: This phase of training shall comprise of on the job training during start-up, checkout period, and performance test period. VA facilities personnel will work with the Contractor's installation and test personnel on a daily basis during start-up and checkout period. During the performance test period, controls subcontractor will provide 8 hours of instructions, given in multiple training sessions (each no longer than four hours in length), to the VA facilities personnel.
3. The O/M Manuals shall contain approved submittals as outlined in Article 1.7, SUBMITTALS. The Controls subcontractor will review the manual contents with VA facilities personnel during second phase of training.
4. Training shall be given by direct employees of the controls system subcontractor.

1.9 PROJECT CONDITIONS (ENVIRONMENTAL CONDITIONS OF OPERATION)

A. The ECC and peripheral devices and system support equipment shall be designed to operate in ambient condition of 20 to 35°C (65 to 90°F) at a relative humidity of 20 to 80% non-condensing.

B. The CUs used outdoors shall be mounted in NEMA 4 waterproof enclosures, and shall be rated for operation at –40 to 65°C (-40 to 150°F).

C. All electronic equipment shall operate properly with power fluctuations of plus 10 percent to minus 15 percent of nominal supply voltage.

D. Sensors and controlling devices shall be designed to operate in the environment, which they are sensing or controlling.

1.10 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

Standard 135-10.....BACNET Building Automation and Control Networks

C. American Society of Mechanical Engineers (ASME):

B16.18-01.....Cast Copper Alloy Solder Joint Pressure Fittings.

B16.22-01.....Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

D. American Society of Testing Materials (ASTM):

B32-08.....Standard Specification for Solder Metal

B88-09.....Standard Specifications for Seamless Copper Water Tube

B88M-09.....Standard Specification for Seamless Copper Water Tube (Metric)

B280-08.....Standard Specification for Seamless Copper Tube for Air-Conditioning and Refrigeration Field Service

D2737-03.....Standard Specification for Polyethylene (PE) Plastic Tubing

E. Federal Communication Commission (FCC):

Rules and Regulations Title 47 Chapter 1-2001 Part 15: Radio Frequency Devices.

F. Institute of Electrical and Electronic Engineers (IEEE):

802.3-11.....Information Technology-Telecommunications and Information Exchange between Systems-Local and Metropolitan Area Networks- Specific Requirements-Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access method and Physical Layer Specifications

G. National Fire Protection Association (NFPA):

70-11.....National Electric Code

90A-09.....Standard for Installation of Air-Conditioning and Ventilation Systems

H. Underwriter Laboratories Inc (UL):

94-10.....Tests for Flammability of Plastic Materials for Parts and Devices and Appliances

294-10.....Access Control System Units

486A/486B-10.....Wire Connectors

555S-11.....Standard for Smoke Dampers

916-10.....Energy Management Equipment

1076-10.....Proprietary Burglar Alarm Units and Systems

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Spare parts shall be available for at least five years after completion of this contract.

2.2 CONTROLS SYSTEM ARCHITECTURE

A. General

1. The Controls Systems shall consist of multiple Nodes and associated equipment connected by industry standard digital and communication network arrangements.
2. The ECC, building controllers and principal communications network equipment shall be standard products of recognized major manufacturers available through normal PC and computer vendor channels – not "Clones" assembled by a third-party subcontractor.
3. The networks shall, at minimum, comprise, as necessary, the following:
   a. A fixed ECC and a portable operator’s terminal.
   b. Network computer processing, data storage and BACnet-compliant communication equipment including Servers and digital data processors.
   c. BACnet-compliant routers, bridges, switches, hubs, modems, gateways, interfaces, and similar communication equipment.
   d. Active processing BACnet-compliant building controllers connected to other BACNet-compliant controllers together with their power supplies and associated equipment.
   e. Addressable elements, sensors, transducers, and end devices.
   f. Third-party equipment interfaces and gateways as described and required by the Contract Documents.
   g. Other components required for a complete and working Control Systems as specified.

B. The Specifications for the individual elements and component subsystems shall be minimum requirements and shall be augmented as necessary by the Contractor to achieve both compliance with all applicable codes, standards and to meet all requirements of the Contract Documents.

C. Network Architecture

1. The Controls communication network shall utilize BACnet communications protocol operating over a standard Ethernet LAN and operate at a minimum speed of 100 Mb/sec.
2. The networks shall utilize only copper and optical fiber communication media as appropriate and shall comply with applicable codes, ordinances and regulations. They may also utilize digital wireless technologies as appropriate to the application and if approved by the VA.
3. All necessary telephone lines, ISDN lines and internet Service Provider services and connections will be provided by the VA.

D. Third Party Interfaces:
1. The contractor administered by this Section of the technical specifications shall include necessary hardware, equipment, software, and programming to allow data communications between the controls systems and building systems supplied by other trades.
2. Other manufacturers and contractors supplying other associated systems and equipment shall provide their necessary hardware, software and start-up at their cost and shall cooperate fully with the contractor administered by this Section of the technical specifications in a timely manner and at their cost to ensure complete functional integration.

E. Servers:
1. Provide data storage server(s) to archive historical data including trends, alarm and event histories and transaction logs.
2. Equip these server(s) with the same software tool set that is located in the BACnet building controllers for system configuration and custom logic definition and color graphic configuration.
3. Access to all information on the data storage server(s) shall be through the same browser functionality used to access individual nodes. When logged onto a server the operator will be able to also interact with any other controller on the control system as required for the functional operation of the controls systems. The contractor administered by this Section of the technical specifications shall provide all necessary digital processor programmable data storage server(s).
4. These server(s) shall be utilized for controls systems application configuration, for archiving, reporting and trending of data, for

operator transaction archiving and reporting, for network information management, for alarm annunciation, for operator interface tasks, for controls application management and similar. These server(s) shall utilize IT industry standard data base platforms which utilize a database declarative language designed for managing data in relational database management systems (RDBMS) such as SQL.

2.3 COMMUNICATION

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135-2008, BACnet.
   1. The Data link / physical layer protocol (for communication) acceptable to the VA throughout its facilities is Ethernet (ISO 8802-3) and BACnet/IP.
   2. The MS/TP data link / physical layer protocol is not acceptable to the VA in any new BACnet network or sub-network in its healthcare or lab facilities.

B. Each controller shall have a communication port for connection to an operator interface.

C. Project drawings indicate remote buildings or sites to be connected by a nominal 56,000 baud modem over voice-grade telephone lines. In each remote location a modem and field device connection shall allow communication with each controller on the internetwork as specified in Paragraph D.

D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
   1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, reports, system software, and custom programs shall be viewable and editable from each internetwork controller.
   2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute specified control system

operation. An authorized operator shall be able to edit cross-controller links by typing a standard object address.

E. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring. Expansion shall not require operator interface hardware additions or software revisions.

F. ECCs and Controllers with real-time clocks shall use the BACnet Time Synchronization service. The system shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight savings and standard time as applicable.

2.7 NETWORK AND DEVICE NAMING CONVENTION

A. Network Numbers

1. BACnet network numbers shall be based on a "facility code, network" concept. The "facility code" is the VAMC's or VA campus' assigned numeric value assigned to a specific facility or building. The "network" typically corresponds to a "floor" or other logical configuration within the building. BACnet allows 65535 network numbers per BACnet internet work.
2. The network numbers are thus formed as follows: "Net #" = "FFFNN" where:
   a. FFF = Facility code (see below)
   b. NN = 00-99 This allows up to 100 networks per facility or building

B. Device Instances

1. BACnet allows 4194305 unique device instances per BACnet internet work. Using Agency's unique device instances are formed as follows: "Dev #" = "FFFNNDD" where
   a. FFF and N are as above and
   b. DD = 00-99, this allows up to 100 devices per network.
2. Note Special cases, where the network architecture of limiting device numbering to DD causes excessive subnet works. The device number can be expanded to DDD and the network number N can become a single digit. In NO case shall the network number N and the device number D exceed 4 digits.
3. Facility code assignments:
4. 000-400 Building/facility number

5. Note that some facilities have a facility code with an alphabetic suffix to denote wings, related structures, etc. The suffix will be ignored. Network numbers for facility codes above 400 will be assigned in the range 000-399.

C. Device Names

1. Name the control devices based on facility name, location within a facility, the system or systems that the device monitors and/or controls, or the area served. The intent of the device naming is to be easily recognized. Names can be up to 254 characters in length, without embedded spaces. Provide the shortest descriptive, but unambiguous, name. For example, in building #123 prefix the number with a "B" followed by the building number, if there is only one chilled water pump "CHWP-1", a valid name would be "B123.CHWP. 1.STARTSTOP". If there are two pumps designated "CHWP-1", one in a basement mechanical room (Room 0001) and one in a penthouse mechanical room (Room PH01), the names could be "B123.R0001.CHWP.1. STARTSTOP" or "B123.RPH01.CHWP.1.STARTSTOP". In the case of unitary controllers, for example a VAV box controller, a name might be "B123.R101.VAV". These names should be used for the value of the "Object_Name" property of the BACnet Device objects of the controllers involved so that the BACnet name and the EMCS name are the same.

2.8 BACNET DEVICES

A. All BACnet Devices – controllers, gateways, routers, actuators and sensors shall conform to BACnet Device Profiles and shall be BACnet Testing Laboratories (BTL) -Listed as conforming to those Device Profiles. Protocol Implementation Conformance Statements (PICSs), describing the BACnet capabilities of the Devices shall be published and available of the Devices through links in the BTL website.

1. BACnet Building Controllers, historically referred to as NACs, shall conform to the BACnet B-BC Device Profile, and shall be BTL-Listed as conforming to the B-BC Device Profile. The Device's PICS shall be submitted.
2. BACnet Advanced Application Controllers shall conform to the BACnet B-AAC Device Profile and shall be BTL-Listed as conforming to the B-AAC Device Profile. The Device's PICS shall be submitted.

3. BACnet Application Specific Controllers shall conform to the BACnet B-ASC Device Profile and shall be BTL-Listed as conforming to the B-ASC Device Profile. The Device's PICS shall be submitted.
4. BACnet Smart Actuators shall conform to the BACnet B-SA Device Profile and shall be BTL-Listed as conforming to the B-SA Device Profile. The Device's PICS shall be submitted.
5. BACnet Smart Sensors shall conform to the BACnet B-SS Device Profile and shall be BTL-Listed as conforming to the B-SS Device Profile. The Device's PICS shall be submitted.
6. BACnet routers and gateways shall conform to the BACnet B-OTH Device Profile and shall be BTL-Listed as conforming to the B-OTH Device Profile. The Device's PICS shall be submitted.

2.9 CONTROLLERS

A. General. Provide an adequate number of BTL-Listed B-BC building controllers and an adequate number of BTL-Listed B-AAC advanced application controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these controllers shall meet the following requirements.

1. The controller shall have sufficient memory to support its operating system, database, and programming requirements.
2. The building controller shall share data with the ECC and the other networked building controllers. The advanced application controller shall share data with its building controller and the other networked advanced application controllers.
3. The operating system of the controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
4. Controllers that perform scheduling shall have a real-time clock.
5. The controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
   a. assume a predetermined failure mode, and
   b. generate an alarm notification.
6. The controller shall communicate with other BACnet devices on the internetwork using the BACnet Read (Execute and Initiate) and Write (Execute and Initiate) Property services.

7. Communication.
   a. Each controller shall reside on a BACnet network using the ISO 8802-3 (Ethernet) Data Link/Physical layer protocol for its communications. Each building controller also shall perform BACnet routing if connected to a network of custom application and application specific controllers.
   b. The controller shall provide a service communication port using BACnet Data Link/Physical layer protocol for connection to a portable operator's terminal.
8. Keypad. A local keypad and display shall be provided for each controller. The keypad shall be provided for interrogating and editing data. Provide a system security password shall be available to prevent unauthorized use of the keypad and display.
9. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
10. Memory. The controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
11. The controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Controller operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

B. Provide BTL-Listed B-ASC application specific controllers for each piece of equipment for which they are constructed. Application specific controllers shall communicate with other BACnet devices on the internetwork using the BACnet Read (Execute) Property service.
   1. Each B-ASC shall be capable of stand-alone operation and shall continue to provide control functions without being connected to the network.
   2. Each B-ASC will contain sufficient I/O capacity to control the target system.
   3. Communication.
      a. Each controller shall reside on a BACnet network using the ISO 8802-3 (Ethernet) Data Link/Physical layer protocol for its communications. Each building controller also shall perform

BACnet routing if connected to a network of custom application and application specific controllers.

b. Each controller shall have a BACnet Data Link/Physical layer compatible connection for a laptop computer or a portable operator's tool. This connection shall be extended to a space temperature sensor port where shown.

4. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
5. Memory. The application specific controller shall use nonvolatile memory and maintain all BIOS and programming information in the event of a power loss.
6. Immunity to power and noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
7. Transformer. Power supply for the ASC must be rated at a minimum of 125% of ASC power consumption and shall be of the fused or current limiting type.

C. Direct Digital Controller Software

1. The software programs specified in this section shall be commercially available, concurrent, multi-tasking operating system and support the use of software application that operates under DOS or Microsoft Windows.
2. All points shall be identified by up to 30-character point name and 16-character point descriptor. The same names shall be used at the ECC.
3. All control functions shall execute within the stand-alone control units via DDC algorithms. The VA shall be able to customize control strategies and sequences of operations defining the appropriate control loop algorithms and choosing the optimum loop parameters.
4. All controllers shall be capable of being programmed to utilize stored default values for assured fail-safe operation of critical processes. Default values shall be invoked upon sensor failure or, if the primary value is normally provided by the central or another CU, or by loss of bus communication. Individual application software

packages shall be structured to assume a fail-safe condition upon loss of input sensors. Loss of an input sensor shall result in output of a sensor-failed message at the ECC. Each ACU and RCU shall have capability for local readouts of all functions. The UCUs shall be read remotely.

5. All DDC control loops shall be able to utilize any of the following control modes:
   a. Two position (on-off, slow-fast) control.
   b. Proportional control.
   c. Proportional plus integral (PI) control.
   d. Proportional plus integral plus derivative (PID) control. All PID programs shall automatically invoke integral wind up prevention routines whenever the controlled unit is off, under manual control of an automation system or time-initiated program.
   e. Automatic tuning of control loops.
6. System Security: Operator access shall be secured using individual password and operator’s name. Passwords shall restrict the operator to the level of object, applications, and system functions assigned to him. A minimum of six (6) levels of security for operator access shall be provided.
7. Application Software: The controllers shall provide the following programs as a minimum for the purpose of optimizing energy consumption while maintaining comfortable environment for occupants. All application software shall reside and run in the system digital controllers. Editing of the application shall occur at the ECC or via a portable operator’s terminal, when it is necessary, to directly access the programmable unit.
   a. Power Demand Limiting (PDL): Power demand limiting program shall monitor the building power consumption and limit the consumption of electricity to prevent peak demand charges. PDL shall continuously track the electricity consumption from a pulse input generated at the kilowatt-hour/demand electric meter. PDL shall sample the meter data to continuously forecast the electric demand likely to be used during successive time intervals. If the forecast demand indicates that electricity usage will likely exceed a user preset maximum allowable level, then PDL shall automatically shed electrical loads. Once the demand load has

met, loads that have been shed shall be restored and returned to normal mode. Control system shall be capable of demand limiting by resetting the HVAC system set points to reduce load while maintaining indoor air quality.

b. Economizer: An economizer program shall be provided for VAV systems. This program shall control the position of air handler relief, return, and outdoors dampers. If the outdoor air dry bulb temperature falls below changeover set point the energy control center will modulate the dampers to provide 100 percent outdoor air. The operator shall be able to override the economizer cycle and return to minimum outdoor air operation at any time.

c. Night Setback/Morning Warm up Control: The system shall provide the ability to automatically adjust set points for this mode of operation.

d. Optimum Start/Stop (OSS): Optimum start/stop program shall automatically be coordinated with event scheduling. The OSS program shall start HVAC equipment at the latest possible time that will allow the equipment to achieve the desired zone condition by the time of occupancy, and it shall also shut down HVAC equipment at the earliest possible time before the end of the occupancy period and still maintain desired comfort conditions. The OSS program shall consider both outside weather conditions and inside zone conditions. The program shall automatically assign longer lead times for weekend and holiday shutdowns. The program shall poll all zones served by the associated AHU and shall select the warmest and coolest zones. These shall be used in the start time calculation. It shall be possible to assign occupancy start times on a per air handler unit basis. The program shall meet the local code requirements for minimum outdoor air while the building is occupied. Modification of assigned occupancy start/stop times shall be possible via the ECC.

e. Event Scheduling: Provide a comprehensive menu driven program to automatically start and stop designated points or a group of points according to a stored time. This program shall provide the capability to individually command a point or group of points.

When points are assigned to one common load group it shall be possible to assign variable time advances/delays between each successive start or stop within that group. Scheduling shall be calendar based and advance schedules may be defined up to one year in advance. Advance schedule shall override the day-to-day schedule. The operator shall be able to define the following information:

1) Time, day.
2) Commands such as on, off, auto.
3) Time delays between successive commands.
4) Manual overriding of each schedule.
5) Allow operator intervention.

f. Alarm Reporting: The operator shall be able to determine the action to be taken in the event of an alarm. Alarms shall be routed to the ECC based on time and events. An alarm shall be able to start programs, login the event, print and display the messages. The system shall allow the operator to prioritize the alarms to minimize nuisance reporting and to speed operator's response to critical alarms. A minimum of six (6) priority levels of alarms shall be provided for each point.

g. Remote Communications: The system shall have the ability to dial out in the event of an alarm to the ECC and alpha-numeric pagers. The alarm message shall include the name of the calling location, the device that generated the alarm, and the alarm message itself. The operator shall be able to remotely access and operate the system using dial up communications. Remote access shall allow the operator to function the same as local access.

h. Maintenance Management (PM): The program shall monitor equipment status and generate maintenance messages based upon the operators defined equipment run time, starts, and/or calendar date limits. A preventative maintenance alarm shall be printed indicating maintenance requirements based on pre-defined run time. Each preventive message shall include point description, limit criteria and preventative maintenance instruction assigned to that limit. A minimum of 480-character PM shall be provided for each component of units such as air handling units.

2.11 SENSORS (AIR, WATER AND STEAM)

A. Sensors' measurements shall be read back to the DDC system, and shall be visible by the ECC.

B. Temperature and Humidity Sensors shall be electronic, vibration and corrosion resistant for wall, immersion, and/or duct mounting. Provide all remote sensors as required for the systems.

1. Temperature Sensors: thermistor type for terminal units and Resistance Temperature Device (RTD) with an integral transmitter type for all other sensors.

a. Duct sensors shall be rigid or averaging type as shown on drawings. Averaging sensor shall be a minimum of 1 linear ft of sensing element for each sq ft of cooling coil face area.

b. Immersion sensors shall be provided with a separable well made of stainless steel, bronze or monel material. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.

c. Space sensors shall be equipped with in-space User set-point adjustment, override switch, numerical temperature display on sensor cover, and communication port. Match room thermostats. Provide a tooled-access cover.

1) Public space sensor: setpoint adjustment shall be only through the ECC or through the DDC system's diagnostic device/laptop. Do not provide in-space User set-point adjustment. Provide an opaque keyed-entry cover if needed to restrict in-space User set-point adjustment.

2) Psychiatric patient room sensor: sensor shall be flush with wall, shall not include an override switch, numerical temperature display on sensor cover, shall not include a communication port and shall not allow in-space User set-point adjustment. Setpoint adjustment shall be only through the ECC or through the DDC system's diagnostic device/laptop. Provide a stainless-steel cover plate with an insulated back and security screws.

d. Outdoor air temperature sensors shall have watertight inlet fittings and be shielded from direct sunlight.

e. Room security sensors shall have stainless steel cover plate with insulated back and security screws.

f. Wire: Twisted, shielded-pair cable.

g. Output Signal: 4-20 ma.

C. Static Pressure Sensors: Non-directional, temperature compensated.

1. 4-20 ma output signal.
2. 0 to 5 inches wg for duct static pressure range.
3. 0 to 0.25 inch wg for Building static pressure range.

F. Steam Flow Sensor/Transmitter:

1. Sensor: Vortex shedder incorporating wing type sensor and amplification technology for high signal-to-noise ratio, carbon steel body with 316 stainless steel working parts, 24 VDC power, NEMA 4 enclosure.

a. Ambient conditions, -40°C to 80°C (-40°F to 175°F).

b. Process conditions, 900 kPa (125 psig) saturated steam.

c. Turn down ratio, 20 to 1.

d. Output signal, 4-20 ma DC.

e. Processor/Transmitter, NEMA 4 enclosure with keypad program selector and six digit LCD output display of instantaneous flow rate or totalized flow, solid state switch closure signal shall be provided to the nearest DDC panel for totalization.

1) Ambient conditions, -20°C to 50°C (0°F-120°F), 0 95 percent non-condensing RH.

2) Power supply, 120 VAC, 60 hertz or 24 VDC.

3) Internal battery, provided for 24-month retention of RAM contents when all other power sources are removed.

f. Sensor on all steam lines shall be protected by pigtail siphons installed between the sensor and the line, and shall have an isolation valve installed between the sensor and pressure source.

2.12 CONTROL CABLES

A. General:

1. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments. Comply with Sections 27 05 26 and 26 05 26.
2. Cable conductors to provide protection against induction in circuits. Crosstalk attenuation within the System shall be in excess of -80 dB throughout the frequency ranges specified.

3. Minimize the radiation of RF noise generated by the System equipment so as not to interfere with any audio, video, data, computer main distribution frame (MDF), telephone customer service unit (CSU), and electronic private branch exchange (EPBX) equipment the System may service.
4. The as-installed drawings shall identify each cable as labeled, used cable, and bad cable pairs.
5. Label system's cables on each end. Test and certify cables in writing to the VA before conducting proof-of-performance testing. Minimum cable test requirements are for impedance compliance, inductance, capacitance, signal level compliance, opens, shorts, cross talk, noise, and distortion, and split pairs on all cables in the frequency ranges used. Make available all cable installation and test records at demonstration to the VA. All changes (used pair, failed pair, etc.) shall be posted in these records as the change occurs.
6. Power wiring shall not be run in conduit with communications trunk wiring or signal or control wiring operating at 100 volts or less.

B. Analogue control cabling shall be not less than No. 18 AWG solid, with thermoplastic insulated conductors as specified in Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables.

C. Copper digital communication cable between the ECC and the B-BC and B-AAC controllers shall be 100BASE-TX Ethernet, Category 5e or 6, not less than minimum 24 American Wire Gauge (AWG) solid, Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), with thermoplastic insulated conductors, enclosed in a thermoplastic outer jacket, as specified in Section 27 15 00.
   1. Other types of media commonly used within IEEE Std 802.3 LANs (e.g., 10Base-T and 10Base-2) shall be used only in cases to interconnect with existing media.

D. Optical digital communication fiber, if used, shall be Multimode or Singlemode fiber, 62.5/125 micron for multimode or 10/125 micron for singlemode micron with SC or ST connectors as specified in TIA-568-C.1. Terminations, patch panels, and other hardware shall be compatible with the specified fiber and shall be as specified in Section 27 15 00. Fiber-optic cable shall be suitable for use with the 100Base-FX or the 100Base-SX standard (as applicable) as defined in IEEE Std 802.3.

2.13 THERMOSTATS AND HUMIDISTATS

A. Room thermostats controlling unitary standalone heating and cooling devices not connected to the DDC system shall have three modes of operation (heating - null or dead band - cooling). Thermostats for patient bedrooms shall have capability of being adjusted to eliminate null or dead band. Wall mounted thermostats shall have polished or brushed aluminum finish, setpoint range and temperature display and external adjustment:

1. Electronic Thermostats: Solid-state, microprocessor based, programmable to daily, weekend, and holiday schedules.
   a. Public Space Thermostat: Public space thermostat shall have a thermistor sensor and shall not have a visible means of set point adjustment. Adjustment shall be via the digital controller to which it is connected.
   b. Patient Room Thermostats: thermistor with in-space User set point adjustment and an on-casing room temperature numerical temperature display.
   c. Psychiatric Patient Room Sensors: Electronic duct sensor as noted under Article 2.4.
   d. Battery replacement without program loss.

B. Strap-on thermostats shall be enclosed in a dirt-and-moisture proof housing with fixed temperature switching point and single pole, double throw switch.

C. Freezestats shall have a minimum of 300 mm (one linear foot) of sensing element for each 0.093 square meter (one square foot) of coil area. A freezing condition at any increment of 300 mm (one foot) anywhere along the sensing element shall be sufficient to operate the thermostatic element. Freezestats shall be manually-reset.

2.14 FINAL CONTROL ELEMENTS AND OPERATORS

A. Fail Safe Operation: Control valves and dampers shall provide "fail safe" operation in either the normally open or normally closed position as required for freeze, moisture, and smoke or fire protection.

B. Spring Ranges: Range as required for system sequencing and to provide tight shut-off.

C. Power Operated Control Dampers (other than VAV Boxes): Factory fabricated, balanced type dampers. All modulating dampers shall be opposed blade type and gasketed. Blades for two-position, duct-mounted

dampers shall be parallel, airfoil (streamlined) type for minimum noise generation and pressure drop.

1. Leakage: Except as specified in subparagraph 2 below, maximum leakage in closed position shall not exceed 7 L/S (15 CFMs) differential pressure for outside air and exhaust dampers and 200 L/S/ square meter (40 CFM/sq. ft.) at 50 mm (2 inches) differential pressure for other dampers.
2. Frame shall be galvanized steel channel with seals as required to meet leakage criteria.
3. Blades shall be galvanized steel or aluminum, 200 mm (8 inch) maximum width, with edges sealed as required.
4. Bearing shall be nylon, bronze sleeve or ball type.
5. Hardware shall be zinc-plated steel. Connected rods and linkage shall be non-slip. Working parts of joints shall be brass, bronze, nylon or stainless steel.
6. Maximum air velocity and pressure drop through free area the dampers:
   a. Smoke damper in air handling unit: 305 meter per minute (1000 fpm).
   b. Duct mounted damper: 600 meter per minute (2000 fpm).
   c. Maximum static pressure loss: 50 Pascal (0.20 inches water gage).

D. Smoke Dampers and Combination Fire/Smoke Dampers: Dampers and operators are specified in Section 23 31 00, HVAC DUCTS AND CASINGS. Control of these dampers is specified under this Section.

E. Control Valves:

1. Valves shall be rated for a minimum of 150 percent of system operating pressure at the valve location but not less than 900 kPa (125 psig).
2. Valves 50 mm (2 inches) and smaller shall be bronze body with threaded or flare connections.
3. Valves 60 mm (2 1/2 inches) and larger shall be bronze or iron body with flanged connections.
4. Brass or bronze seats except for valves controlling media above 100 degrees C (210 degrees F), which shall have stainless steel seats.
5. Flow characteristics:

a. Three way modulating valves shall be globe pattern. Position versus flow relation shall be linear relation for steam or equal percentage for water flow control.
b. Two-way modulating valves shall be globe pattern. Position versus flow relation shall be linear for steam and equal percentage for water flow control.
c. Two-way 2-position valves shall be ball, gate or butterfly type.

6. Maximum pressure drop:
a. Two position steam control: 20 percent of inlet gauge pressure.
b. Modulating Steam Control: 80 percent of inlet gauge pressure (acoustic velocity limitation).
c. Modulating water flow control, greater of 3 meters (10 feet) of water or the pressure drop through the apparatus.

7. Two position water valves shall be line size.

F. Damper and Valve Operators and Relays:

1. Pneumatic operators, spring return type with non-ferrous metal bellows or diaphragm of neoprene or other elastomer. Bellows or diaphragm shall be of sufficient size so that a change in operating pressure of not more than two (2) percent of the total motor operating pressure range will be required to start the valve or damper moving. Provide positive positioning or sequencing relays with adjustable operating range and starting point for operators sequenced with other operators to permit adjustment of control sequences, except for control valves in confined spaces in terminal units, which may use springs with range selected to provide necessary sequencing. Metal parts shall be aluminum, mill finish galvanized steel, or zinc plated steel or stainless steel.
2. Electric operator shall provide full modulating control of dampers and valves. A linkage and pushrod shall be furnished for mounting the actuator on the damper frame internally in the duct or externally in the duct or externally on the duct wall, or shall be furnished with a direct-coupled design. Metal parts shall be aluminum, mill finish galvanized steel, or zinc plated steel or stainless steel. Provide actuator heads which allow for electrical conduit attachment. The motors shall have sufficient closure torque to allow for complete closure of valve or damper under pressure.

Provide multiple motors as required to achieve sufficient close-off torque.

a. Minimum valve close-off pressure shall be equal to the system pump's dead-head pressure, minimum 50 psig for valves smaller than 4 inches.

3. Electronic damper operators: Metal parts shall be aluminum, mill finish galvanized steel, or zinc plated steel or stainless steel. Provide actuator heads which allow for electrical conduit attachment. The motors shall have sufficient closure torque to allow for complete closure of valve or damper under pressure. Provide multiple motors as required to achieve sufficient close-off torque.

a. VAV Box actuator shall be mounted on the damper axle or shall be of the air valve design, and shall provide complete modulating control of the damper. The motor shall have a closure torque of 35-inch pounds minimum with full torque applied at close off to attain minimum leakage.

4. See drawings for required control operation.

2.15 AIR FLOW CONTROL

A. Airflow and static pressure shall be controlled via digital controllers with inputs from airflow control measuring stations and static pressure inputs as specified. Controller outputs shall be analog or pulse width modulating output signals. The controllers shall include the capability to control via simple proportional (P) control, proportional plus integral (PI), proportional plus integral plus derivative (PID), and on-off. The airflow control programs shall be factory-tested programs that are documented in the literature of the control manufacturer.

B. Air Flow Measuring Station -- Pneumatic Type:

1. Airflow measuring stations shall measure airflow by the pitot tube traverse method. Each unit shall consist of a network of static and total pressure sensors, factory positioned and connected in parallel, to produce an equalized velocity pressure. The measured velocity pressure converted to airflow (cfm) shall have accuracy within 2 percent of the full scale throughout the velocity range from 200 to 1,200 meter per minute (700 to 4,000 fpm).

2. Airflow measuring stations shall consist of 16-gauge sheet metal casing, an aluminum air velocity treatment and air straightening

section with an open face area not less than 97 percent and a total and static pressure sensing manifold made of copper. Each station shall contain noncombustible sensors which shall be incapable of producing toxic gases or fumes in the event of elevated duct temperatures. All interconnecting tubing shall be internal to the unit with the exception of one total pressure and one static pressure meter connection.

3. Each air flow measuring station shall be installed to meet at least the manufacturer's minimum installation conditions and shall not amplify the sound level within the duct. The maximum resistance to airflow shall not exceed 0.3 times the velocity head for the duct stations and 0.6 times the velocity head for the fan stations. The unit shall be suitable for continuous operation up to a temperature of 120°C (250°F).
4. Differential pressure transducers shall measure and transmit pressure signals to the direct digital controller..

1. Electronics Panel:
   a. Electronics Panel shall consist of a surface mounted enclosure complete with solid-state microprocessor and software.
   b. Electronics Panel shall be A/C powered 120 VACand shall have the capability to transmit signals of 0-5 VDC, 0-10 VCD or 4-20 ma for use in control of the HVAC Systems. The electronic panel shall have the capability to accept user defined scaling parameters for all output signals.
   c. Electronics Panel shall have the capability to digitally display airflow in CFMand temperature in degrees F. The displays shall be provided as an integral part of the electronics panel. The electronic panel shall have the capability to totalize the output flow in CFM for two or more systems, as required. A single output signal may be provided which will equal the sum of the systems totalized. Output signals shall be provided for temperature and airflow. Provide remote mounted air flow or temperature displays where indicated on the plans.
   d. Electronics Panel shall have the following:
      1) Minimum of 12-bit A/D conversion.
      2) Field adjustable digital primary output offset and gain.
      3) Airflow analog output scaling of 100 to 10,000 FPM.

4) Temperature analog output scaling from -45°C to 70°C (-50°F to 160°F).

5) Analog output resolution (full scale output) of 0.025%.

e. All readings shall be in I.P. units.

4. Thermal flow sensors and its electronics shall be installed as per manufacturer's instructions. The probe sensor density shall be as follows:

Probe Sensor Density	
Area (sq.ft.)	Qty. Sensors
<=1	2
>1 to <4	4
4 to <8	6
8 to <12	8
12 to <16	12
>=16	16

a. Complete installation shall not exhibit more than ± 2.0% error in airflow measurement output for variations in the angle of flow of up to 10 percent in any direction from its calibrated orientation. Repeatability of readings shall be within ± 0.25%.

D. Static Pressure Measuring Station: shall consist of one or more static pressure sensors and transmitters along with relays or auxiliary devices as required for a complete functional system. The span of the transmitter shall not exceed two times the design static pressure at the point of measurement. The output of the transmitter shall be true representation of the input pressure with plus or minus 25 Pascal (0.1 inch) W.G. of the true input pressure:

1. Static pressure sensors shall have the same requirements as Airflow Measuring Devices except that total pressure sensors are optional, and only multiple static pressure sensors positioned on an equal area basis connected to a network of headers are required.
2. For systems with multiple major trunk supply ducts, furnish a static pressure transmitter for each trunk duct. The transmitter signal representing the lowest static pressure shall be selected and this shall be the input signal to the controller.
3. The controller shall receive the static pressure transmitter signal and CU shall provide a control output signal to the supply fan capacity control device. The control mode shall be proportional plus

integral (PI) (automatic reset) and where required shall also include derivative mode.

4. In systems with multiple static pressure transmitters, provide a switch located near the fan discharge to prevent excessive pressure during abnormal operating conditions. High-limit switches shall be manually reset.

E. Constant Volume Control Systems shall consist of an air flow measuring station along with such relays and auxiliary devices as required to produce a complete functional system. The transmitter shall receive its air flow signal and static pressure signal from the flow measuring station and shall have a span not exceeding three times the design flow rate. The CU shall receive the transmitter signal and shall provide an output to the fan volume control device to maintain a constant flow rate. The CU shall provide proportional plus integral (PI) (automatic reset) control mode and where required also inverse derivative mode. Overall system accuracy shall be plus or minus the equivalent of 2 Pascal (0.008 inch) velocity pressure as measured by the flow station.

F. Airflow Synchronization:

1. Systems shall consist of an air flow measuring station for each supply and return duct, the CU and such relays, as required to provide a complete functional system that will maintain a constant flow rate difference between supply and return air to an accuracy of ±10%. In systems where there is no suitable location for a flow measuring station that will sense total supply or return flow, provide multiple flow stations with a differential pressure transmitter for each station. Signals from the multiple transmitters shall be added through the CU such that the resultant signal is a true representation of total flow.
2. The total flow signals from supply and return air shall be the input signals to the CU. This CU shall track the return air fan capacity in proportion to the supply air flow under all conditions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Examine project plans for control devices and equipment locations; and report any discrepancies, conflicts, or omissions to COR for resolution before proceeding for installation.
2. Install equipment, piping, wiring /conduit parallel to or at right angles to building lines.
3. Install all equipment and piping in readily accessible locations. Do not run tubing and conduit concealed under insulation or inside ducts.
4. Mount control devices, tubing and conduit located on ducts and apparatus with external insulation on standoff support to avoid interference with insulation.
5. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
6. Run tubing and wire connecting devices on or in control cabinets parallel with the sides of the cabinet neatly racked to permit tracing.
7. Install equipment level and plum.

A. Electrical Wiring Installation:

1. All wiring cabling shall be installed in conduits. Install conduits and wiring in accordance with Specification Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS. Conduits carrying control wiring and cabling shall be dedicated to the control wiring and cabling: these conduits shall not carry power wiring. Provide plastic end sleeves at all conduit terminations to protect wiring from burrs.
2. Install analog signal and communication cables in conduit and in accordance with Specification Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables. Install digital communication cables in conduit and in accordance with Specification Section 27 15 00, Communications Structured Cabling.
3. Install conduit and wiring between operator workstation(s), digital controllers, electrical panels, indicating devices, instrumentation, miscellaneous alarm points, thermostats, and relays as shown on the drawings or as required under this section.
2. Install all electrical work required for a fully functional system and not shown on electrical plans or required by electrical

specifications. Where low voltage (less than 50 volt) power is required, provide suitable Class B transformers.

5. Install all system components in accordance with local Building Code and National Electric Code.
   a. Splices: Splices in shielded and coaxial cables shall consist of terminations and the use of shielded cable couplers. Terminations shall be in accessible locations. Cables shall be harnessed with cable ties.
   b. Equipment: Fit all equipment contained in cabinets or panels with service loops, each loop being at least 300 mm (12 inches) long. Equipment for fiber optics system shall be rack mounted, as applicable, in ventilated, self-supporting, code gauge steel enclosure. Cables shall be supported for minimum sag.
   c. Cable Runs: Keep cable runs as short as possible. Allow extra length for connecting to the terminal board. Do not bend flexible coaxial cables in a radius less than ten times the cable outside diameter.
   d. Use vinyl tape, sleeves, or grommets to protect cables from vibration at points where they pass around sharp corners, through walls, panel cabinets, etc.
6. Conceal cables, except in mechanical rooms and areas where other conduits and piping are exposed.
7. Permanently label or code each point of all field terminal strips to show the instrument or item served. Color-coded cable with cable diagrams may be used to accomplish cable identification.
8. Grounding: ground electrical systems per manufacturer’s written requirements for proper and safe operation.

C. Install Sensors and Controls:
   1. Temperature Sensors:
      a. Install all sensors and instrumentation according to manufacturer’s written instructions. Temperature sensor locations shall be readily accessible, permitting quick replacement and servicing of them without special skills and tools.
      b. Calibrate sensors to accuracy specified, if not factory calibrated.
      c. Use of sensors shall be limited to its duty, e.g., duct sensor shall not be used in lieu of room sensor.

d. Install room sensors permanently supported on wall frame. They shall be mounted at 1.5 meter (5.0 feet) above the finished floor.
e. Mount sensors rigidly and adequately for the environment within which the sensor operates. Separate extended-bulb sensors form contact with metal casings and coils using insulated standoffs.
g. All pipe mounted temperature sensors shall be installed in wells.
h. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor reading.
i. Permanently mark terminal blocks for identification. Protect all circuits to avoid interruption of service due to short-circuiting or other conditions. Line-protect all wiring that comes from external sources to the site from lightning and static electricity.

2. Pressure Sensors:
   a. Install duct static pressure sensor tips facing directly downstream of airflow.
   b. Install high-pressure side of the differential switch between the pump discharge and the check valve.
   c. Install snubbers and isolation valves on steam pressure sensing devices.
3. Actuators:
   a. Mount and link damper and valve actuators according to manufacturer’s written instructions.
   b. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed position.
   c. Check operation of valve/actuator combination to confirm that actuator modulates valve smoothly in both open and closed position.
4. Flow Switches:
   a. Install flow switch according to manufacturer’s written instructions.
   b. Mount flow switch a minimum of 5 pipe diameters up stream and 5 pipe diameters downstream or 600 mm (2 feet) whichever is greater, from fittings and other obstructions.

c. Assure correct flow direction and alignment.

d. Mount in horizontal piping-flow switch on top of the pipe.

E. Installation of digital controllers and programming:

1. Provide a separate digital control panel for each major piece of equipment, such as air handling unit, chiller, pumping unit etc. Points used for control loop reset such as outdoor air, outdoor humidity, or space temperature could be located on any of the remote-control units.
2. Provide sufficient internal memory for the specified control sequences and trend logging. There shall be a minimum of 25 percent of available memory free for future use.
3. System point names shall be modular in design, permitting easy operator interface without the use of a written point index.
4. Provide software programming for the applications intended for the systems specified and adhere to the strategy algorithms provided.
5. Provide graphics for each piece of equipment and floor plan in the building. This includes each chiller, cooling tower, air handling unit, fan, terminal unit, boiler, pumping unit etc. These graphics shall show all points dynamically as specified in the point list.

3.2 SYSTEM VALIDATION AND DEMONSTRATION

A. As part of final system acceptance, a system demonstration is required (see below). Prior to start of this demonstration, the contractor is to perform a complete validation of all aspects of the controls and instrumentation system.

B. Validation

1. Prepare and submit for approval a validation test plan including test procedures for the performance verification tests. Test Plan shall address all specified functions of the ECC and all specified sequences of operation. Explain in detail actions and expected results used to demonstrate compliance with the requirements of this specification. Explain the method for simulating the necessary conditions of operation used to demonstrate performance of the system. Test plan shall include a test check list to be used by the Installer’s agent to check and initial that each test has been successfully completed. Deliver test plan documentation for the performance verification tests to the owner’s representative 30 days prior to start of performance verification tests. Provide draft

copy of operation and maintenance manual with performance verification test.

2. After approval of the validation test plan, installer shall carry out all tests and procedures therein. Installer shall completely check out, calibrate, and test all connected hardware and software to ensure that system performs in accordance with approved specifications and sequences of operation submitted. Installer shall complete and submit Test Check List.

C. Demonstration

1. System operation and calibration to be demonstrated by the installer in the presence of the Architect or VA's representative on random samples of equipment as dictated by the Architect or VA's representative. Should random sampling indicate improper commissioning, the owner reserves the right to subsequently witness complete calibration of the system at no addition cost to the VA.
2. Demonstrate to authorities that all required safeties and life safety functions are fully functional and complete.
3. Make accessible, personnel to provide necessary adjustments and corrections to systems as directed by balancing agency.
4. The following witnessed demonstrations of field control equipment shall be included:
   a. Observe HVAC systems in shut down condition. Check dampers and valves for normal position.
   b. Test application software for its ability to communicate with digital controllers, operator workstation, and uploading and downloading of control programs.
   c. Demonstrate the software ability to edit the control program off-line.
   d. Demonstrate reporting of alarm conditions for each alarm and ensure that these alarms are received at the assigned location, including operator workstations.
   e. Demonstrate ability of software program to function for the intended applications-trend reports, change in status etc.
   f. Demonstrate via graphed trends to show the sequence of operation is executed in correct manner, and that the HVAC systems operate properly through the complete sequence of operation, e.g., seasonal change, occupied/unoccupied mode, and warm-up condition.

g. Demonstrate hardware interlocks and safeties functions, and that the control systems perform the correct sequence of operation after power loss and resumption of power loss.
h. Prepare and deliver to the VA graphed trends of all control loops to demonstrate that each control loop is stable, and the set points are maintained.
i. Demonstrate that each control loop responds to set point adjustment and stabilizes within one (1) minute. Control loop trend data shall be instantaneous and the time between data points shall not be greater than one (1) minute.

5. Witnessed demonstration of ECC functions shall consist of:
   a. Running each specified report.
   b. Display and demonstrate each data entry to show site specific customizing capability. Demonstrate parameter changes.
   c. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
   d. Execute digital and analog commands in graphic mode.
   e. Demonstrate DDC loop precision and stability via trend logs of inputs and outputs (6 loops minimum).
   f. Demonstrate EMS performance via trend logs and command trace.
   g. Demonstrate scan, update, and alarm responsiveness.
   h. Demonstrate spreadsheet/curve plot software, and its integration with database.
   i. Demonstrate on-line user guide and help function and mail facility.
   j. Demonstrate digital system configuration graphics with interactive upline and downline load and demonstrate specified diagnostics.
   k. Demonstrate multitasking by showing dynamic curve plot, and graphic construction operating simultaneously via split screen.
   l. Demonstrate class programming with point options of beep duration, beep rate, alarm archiving, and color banding.

--- END ---

SECTION 23 22 13
STEAM AND CONDENSATE HEATING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Steam, condensate and vent piping inside buildings.

B. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 09 91 00, PAINTING.

D. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

E. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

F. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.

G. Section 23 07 11, HVAC AND BOILER PLANT INSULATION.

H. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

I. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standard will govern.

B. American Society of Mechanical Engineers (ASME):

B1.20.1-2013.....Pipe Threads, General Purpose (Inch)

B16.5-2013.....Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard

B16.9-2012.....Factory Made Wrought Buttwelding Fittings

B16.11-2011.....Forged Fittings, Socket-Welding and Threaded

B16.42-2016.....Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300

B31.9-2014.....Building Services Piping

B40.100-2013.....Pressure Gauges and Gauge Attachments

C. American Society for Testing and Materials (ASTM):

A53/A53M-2017.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A106/A106M-2019.....Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

A216/A216M-2019.....Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service

A285/A285M-2017.....Standard Specification for Pressure Vessel Plates, Carbon Steel, Low-and Intermediate-Tensile Strength

A307-2019.....Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength

A516/A516M-2017.....Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service

A536-1984(R2017).....Standard Specification for Ductile Iron Castings

B62-2017.....Standard Specification for Composition Bronze or Ounce Metal Castings

D. American Welding Society (AWS):

B2.1/B2.1M-2014.....Specification for Welding Procedure and Performance Qualifications

Z49.1-2012.....Safety in Welding and Cutting and Allied Processes

E. Manufacturers Standardization Society (MSS) of the Valve and Fitting Industry, Inc.:

SP-80-2013.....Bronze Gate, Globe, Angle, and Check Valves

F. National Board of Boiler and Pressure Vessel Inspectors (NB):

Relieving Capacities of Safety Valves and Relief Valves

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 22 13, STEAM AND CONDENSATE HEATING PIPING", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights,

materials, applications, standard compliance, model numbers, size, and capacity.

1. Pipe and equipment supports. Submit calculations for variable spring and constant support hangers.
2. Pipe and tubing, with specification, class or type, and schedule.
3. Pipe fittings, including miscellaneous adapters and special fittings.
4. Flanges, gaskets, and bolting.
5. Valves of all types.
6. Strainers.
7. Pipe alignment guides.
8. Flexible ball joints: Catalog sheets, performance charts, schematic drawings, specifications and installation instructions.
9. All specified steam system components.
10. Gauges.
11. Thermometers and test wells.
12. Seismic bracing details for piping.

D. Coordination Drawings: Refer to paragraph, SUBMITTALS of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

E. As-Built Piping Diagrams: Provide drawing as follows for steam and steam condensate piping and other central plant equipment.

1. One wall-mounted stick file for prints. Mount stick file in the chiller plant or adjacent control room along with control diagram stick file.
2. One set of reproducible drawings.

F. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:

1. Include complete list indicating all components of the systems.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

G. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

H. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

1.5 QUALITY ASSURANCE

A. Section 23 05 11, COMMON WORK RESULTS FOR HVAC, which includes welding qualifications.

B. The products and execution of work specified in this section shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments shall be enforced, along with requirements of local utility companies. The most stringent requirements of these specifications, local codes, or utility company requirements shall always apply. Any conflicts shall be brought to the attention of the COR.

C. Welding Qualifications: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:

1. Qualify welding processes and operators for piping according to ASME BPVC Section IX, AWS Z49.1 and AWS B2.1/B2.1M.
2. Comply with provisions in ASME B31.9.
3. Certify that each welder and welding operator has passed AWS qualification tests for welding processes involved and that certification is current and recent. Submit documentation to the COR.
4. All welds shall be stamped according to the provisions of the American Welding Society.

D. ASME Compliance: Comply with ASME B31.9 for materials, products, and installation. Safety valves and pressure vessels shall bear appropriate ASME labels.

1.6 AS-BUILT DOCUMENTATION

A. Submit manufacturer’s literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit operation and maintenance data updated to include submittal review comments, VA approved substitutions and construction revisions shall be in electronic version on CD or DVD inserted into a three-ring binder. All aspects of system operation and maintenance procedures, including applicable piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and

maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and shall provide the complete set at the time of final systems certification testing. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement. Provide record drawings as follows:
   1. Red-lined, hand-marked drawings are to be provided, with one paper copy and a scanned PDF version of the hand-marked drawings provided on CD or DVD.
   2. As-built drawings are to be provided, with a copy of them on AutoCAD version 2016 provided on CD or DVD. The CAD drawings shall use multiple line layers with a separate individual layer for each system.

D. The as-built drawings shall indicate the location and type of all lockout/tagout points for all energy sources for all equipment and pumps to include breaker location and numbers, valve tag numbers, etc. Coordinate lockout/tagout procedures and practices with local VA requirements.

E. Certification documentation shall be provided to COR 21 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and provide documentation/certification that all results of tests were within limits specified. Test results shall contain written sequence of test procedure with written test results annotated at each step along with the expected outcome or setpoint. The results shall include all readings, including but not limited to data on device (make, model and performance characteristics), normal pressures, switch ranges, trip points, amp readings, and calibration

data to include equipment serial numbers or individual identifications, etc.

PART 2 - PRODUCTS

2.1 PIPE AND EQUIPMENT SUPPORTS, PIPE SLEEVES, AND WALL AND CEILING PLATES

A. Provide in accordance with Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

2.2 PIPE AND TUBING

A. Steam Piping: Steel, ASTM A53/A53M, Grade B, seamless or ERW; ASTM A106/A106M Grade B, seamless; Schedule 40.

B. Steam Condensate and Pumped Condensate Piping: Steel, ASTM A53/A53M, Grade B, seamless or ERW; or ASTM A106/A106M Grade B, seamless, Schedule 80.

C. Vent Piping: Steel, ASTM A53/A53M, Grade B, seamless or ERW; ASTM A106/A106M Grade B, seamless; Schedule 40, galvanized.

2.3 FITTINGS FOR STEEL PIPE

A. 50 mm (2 inches) and Smaller: Screwed or welded.

1. Cast iron fittings or piping is not acceptable for steam and steam condensate piping. Bushing reduction or use of close nipples is not acceptable.
2. Forged steel, socket welding or threaded: ASME B16.11, 13,790 kPa (2000 psig) class with ASME B1.20.1 threads. Use Schedule 80 pipe and fittings for threaded joints. Lubricant or sealant shall be oil and graphite, or other compound approved for the intended service.
3. Unions: Forged steel, 13,790 kPa (2000 psig) class or 20,685 kPa (3000 psig) class on piping 50 mm (2 inches) and under.
4. Steam line drip station and strainer quick-couple blowdown hose connection: Straight through, plug and socket, screw or cam locking type for 15 mm (1/2 inch) ID hose. No integral shut-off is required.

B. 65 mm (2-1/2 inches) and Larger: Welded or flanged joints.

1. Cast iron fittings or piping is not acceptable for steam and steam condensate piping.
2. Butt welding fittings: ASME B16.9 with same wall thickness as connecting piping. Elbows shall be long radius type, unless otherwise noted.

3. Welding flanges and bolting: ASME B16.5:
   a. Steam service: Weld neck or slip-on, raised face, with non-asbestos gasket. Non-asbestos gasket shall either be stainless steel spiral wound strip with flexible graphite filler or compressed inorganic fiber with nitrile binder rated for saturated and superheated steam service 400 degrees C (750 degrees F) and 10,342 kPa (1500 psig).
   b. Flange bolting: Carbon steel machine bolts or studs and nuts, ASTM A307, Grade B.

C. Welded Branch and Tap Connections: Forged steel weldolets, or branchlets and threadolets may be used for branch connections up to one pipe size smaller than the main. Forged steel half-couplings, ASME B16.11 may be used for drain, vent and gauge connections.

2.4 DIELECTRIC FITTINGS

A. Provide where dissimilar metal pipe are joined.

B. 50 mm (2 inches) and Smaller: Threaded dielectric union.

C. 65 mm (2-1/2 inches) and Larger: Flange union with dielectric gasket and bolt sleeves, ASME B16.42.

D. Temperature Rating, 121 degrees C (250 degrees F) for steam condensate and as required for steam service.

E. Contractor’s option: On pipe sizes 50 mm (2 inches) and smaller, screwed end steel gate valves or dielectric nipples may be used in lieu of dielectric unions.

2.5 VALVES

A. Asbestos packing is not acceptable.

B. All valves of the same type shall be products of a single manufacturer.

C. Provide chain operators for valves 150 mm (6 inches) and larger when the centerline is located 2.1 m (7 feet) or more above the floor or operating platform.

D. Shut-Off Valves:
   1. Gate Valves:
      a. 50 mm (2 inches) and smaller: Forged steel body, rated for 1380 kPa (200 psig) saturated steam, 2758 kPa (400 psig) WOG, bronze wedges and Monel or stainless-steel seats, threaded ends, rising stem, and union bonnet.

b. 65 mm (2-1/2 inches) and larger: Flanged, outside screw and yoke.
   1) High pressure steam 110 kPa (16 psig) and above system): Cast steel body, ASTM A216/A216M grade WCB, 1035 kPa (150 psig) at 260 degrees C (500 degrees F), 11-1/2 to 13 percent chrome stainless steel solid disc and seats. Provide 25 mm (1 inch) factory installed bypass with globe valve on valves 100 mm (4 inches) and larger.
   2) All other services: Forged steel body, Class B, rated for 850 kPa (123 psig) saturated steam, 1380 kPa (200 psig) WOG, bronze or bronze face wedge and seats, 850 kPa (123 psig) ASME flanged ends, OS&Y, rising stem, bolted bonnet, and renewable seat rings.

E. Globe and Angle Valves:
   1. Globe Valves:
      a. 50 mm (2 inches) and smaller: Forged steel body, rated for 1380 kPa (200 psig) saturated steam, 2758 kPa (400 psig) WOG, hardened stainless steel disc and seat, threaded ends, rising stem, union bonnet, and renewable seat rings.
      b. 65 mm (2-1/2 inches) and larger:
         1) Globe valves for high pressure steam 110 kPa (16 psig): Cast steel body, ASTM A216/A216M grade WCB, flanged, OS&Y, 1035 kPa (150 psig) at 260 degrees C (500 degrees F), 11-1/2 to 13 percent chrome stainless steel disc and renewable seat rings.
         2) All other services: Steel body, rated for 850 kPa (123 psig) saturated steam, 1380 kPa (200 psig) WOG, bronze or bronze-faced disc (Teflon or composition facing permitted) and seat, 850 kPa (123 psig) ASME flanged ends, OS&Y, rising stem, bolted bonnet, and renewable seat rings.
   2. Angle Valves:
      a. 50 mm (2 inches) and smaller: Cast steel 1035 kPa (150 psig), union bonnet with metal plug type disc.
      b. 65 mm (2-1/2 inches) and larger:
         1) Angle valves for high pressure steam 110 kPa (16 psig): Cast steel body, ASTM A216/A216M grade WCB, flanged, OS&Y, 1035 kPa (150 psig) at 260 degrees C (500 degrees F), 11-1/2 to 13 percent chrome stainless steel disc and renewable seat rings.

2) All other services: 861 kPa (125 psig), flanged, cast steel body, and bronze trim.

F. Swing Check Valves:
1. 50 mm (2 inches) and smaller: Cast steel, 1035 kPa (150 psig), 45-degree swing disc.
2. 65 mm (2-1/2 inches) and Larger:
a. Check valves for high pressure steam 110 kPa (16 psig) and above system: Cast steel body, ASTM A216/A216M grade WCB, flanged, OS&Y, 1035 kPa (150 psig) at 260 degrees C (500 degrees F), 11-1/2 to 13 percent chrome stainless steel disc and renewable seat rings.
b. All other services: 861 kPa (125 psig), flanged, cast steel body, and bronze trim.

G. Manual Radiator/Convector Valves: Brass, packless, with position indicator.

2.6 STRAINERS

A. Basket or Y Type. Tee type is acceptable for gravity flow and pumped steam condensate service.

B. High Pressure Steam: Rated 1035 kPa (150 psig) saturated steam.
1. 50 mm (2 inches) and smaller: Cast steel, rated for saturated steam at 1034 kPa (150 psig) threaded ends.
2. 65 mm (2-1/2 inches) and larger: Cast steel rated for 1034 kPa (150 psig) saturated steam with 1034 kPa (150 psig) ASME flanged ends or forged steel with 1724 kPa (250 psig) ASME flanged ends.

C. All Other Services: Rated 861 kPa (125 psig) saturated steam.
1. 50 mm (2 inches) and smaller: Cast steel body.
2. 65 mm (2-1/2 inches) and larger: Flanged, cast steel body.

D. Screens: Bronze, Monel metal or 18-8 stainless steel, free area not less than 2-1/2 times pipe area, with perforations as follows:
1. 75 mm (3 inches) and smaller: 20 mesh for steam and 1.1 mm (0.045 inch) diameter perforations for liquids.
2. 100 mm (4 inches) and larger: 1.1 mm (0.045) inch diameter perforations for steam and 3.2 mm (1/8 inch) diameter perforations for liquids.

2.7 PIPE ALIGNMENT

A. Guides: Provide factory-built guides along the pipeline to permit axial movement only and to restrain lateral and angular movement. Guides must

be designed to withstand a minimum of 15 percent of the axial force which will be imposed on the expansion joints and anchors. Field-built guides may be used if detailed on the contract drawings.

2.8 STEAM SYSTEM COMPONENTS

A. Safety Valves and Accessories: Comply with ASME BPVC Section VIII. Capacities shall be certified by National Board of Boiler and Pressure Vessel Inspectors, maximum accumulation 10 percent. Provide lifting lever. Provide drip pan elbow where shown. Valve shall have stainless steel seats and trim.

B. Steam PRV for Individual Equipment: Cast steel body, screwed or flanged ends, rated 861 kPa (125 psig), or 20 percent above the working pressure, whichever is greater. Single-seated, diaphragm operated, spring loaded, adjustable range, all parts renewable.

C. Steam Trap: Each type of trap shall be the product of a single manufacturer. Provide trap sets at all low points and at 61 m (200 feet) intervals on the horizontal main lines.

1. Floats and linkages shall provide sufficient force to open trap valve over full operating pressure range available to the system. Unless otherwise indicated on the drawings, traps shall be sized for capacities indicated at minimum pressure drop as follows:
   a. For equipment with modulating control valve: 1.7 kPa (1/4 psig), based on a condensate leg of 300 mm (12 inches) at the trap inlet and gravity flow to the receiver.
   b. For main line drip trap sets and other trap sets at steam pressure: Up to 70 percent of design differential pressure. Condensate may be lifted to the return line.
2. Trap bodies: Steel, constructed to permit ease of removal and servicing working parts without disturbing connecting piping. The use of raised face flange is required on pipe sizes 1½ inch and above. The use of unions is acceptable for pipe sizes below 1½ inches. For systems without relief valve traps shall be rated for the pressure upstream of the steam supplying the system.
3. Balanced pressure thermostatic elements: Phosphor bronze, stainless steel or Monel metal.
4. Valves and seats: Suitable hardened corrosion resistant alloy.
5. Mechanism: Brass, stainless steel or corrosion resistant alloy.
6. Floats: Stainless steel.

7. Inverted bucket traps: Provide bi-metallic thermostatic element for rapid release of non-condensables.

D. Thermostatic Air Vent (Steam): Steel body, balanced pressure bellows, stainless steel (renewable) valve and seat, rated 861 kPa (125 psig) working pressure, 20 mm (3/4 inch) screwed connections. Air vents shall be balanced pressure type that responds to steam pressure-temperature curve and vents air at any pressure.

2.9 GAUGES, PRESSURE AND COMPOUND

A. ASME B40.100, Accuracy Grade 1A, (pressure, vacuum, or compound), initial mid-scale accuracy 1 percent of scale (Qualify grade), metal or phenolic case, 115 mm (4-1/2 inches) in diameter, 6 mm (1/4 inch) NPT bottom connection, white dial with black graduations and pointer, clear glass or acrylic plastic window, suitable for board mounting. Provide red "set hand" to indicate normal working pressure.

B. Provide steel, lever handle union cock. Provide steel or stainless-steel pressure snubber for gauges in water service. Provide steel pigtail syphon for steam gauges.

C. Pressure gauge ranges shall be selected such that the normal operating pressure for each gauge is displayed near the midpoint of each gauge's range. Gauges with ranges selected such that the normal pressure is displayed at less than 30 percent or more than 70 percent of the gauge's range are prohibited. The units of pressure shall be psig.

2.10 PRESSURE/TEMPERATURE TEST PROVISIONS

A. Provide one each of the following test items to the COR:

1. 6 mm (1/4 inch) FPT by 3.2 mm (1/8 inch) diameter stainless steel pressure gauge adapter probe for extra-long test plug. Pressure/temperature plug is an example.
2. 90 mm (3-1/2 inch) diameter, one percent accuracy, compound gauge, 762 mm (30 inches) Hg to 690 kPa (100 psig) range.
3. 0 to 104 degrees C (32 to 220 degrees F) pocket thermometer one-half degree accuracy, 25 mm (1 inch) dial, 125 mm (5 inch) long stainless-steel stem, plastic case.

2.11 FIRESTOPPING MATERIAL

A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

PART 3 - EXECUTION

3.1 GENERAL

A. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.

B. The drawings show the general arrangement of pipe and equipment but do not show all required fittings and offsets that may be necessary to connect pipes to equipment, fan-coils, coils, radiators, etc., and to coordinate with other trades. Provide all necessary fittings, offsets and pipe runs based on field measurements and at no additional cost or time to the Government. Coordinate with other trades for space available and relative location of HVAC equipment and accessories to be connected on ceiling grid. Pipe location on the drawings shall be altered by contractor where necessary to avoid interferences and clearance difficulties.

C. Store materials to avoid excessive exposure to weather or foreign materials. Keep inside of piping relatively clean during installation and protect open ends when work is not in progress.

D. Support piping securely. Refer to PART 3, Section 23 05 11, COMMON WORK RESULTS FOR HVAC. Install convertors and other heat exchangers at height sufficient to provide gravity flow of condensate to the flash tank and condensate pump.

E. Install piping generally parallel to walls and column center lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide 25 mm (1 inch) minimum clearance between adjacent piping and another surface. Unless shown otherwise, slope steam, condensate and drain piping down in the direction of flow not less than 25 mm (1 inch) in 12 m (40 feet). Provide eccentric reducers to keep bottom of sloped piping flat.

F. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawing.

G. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping. Provide flexibility in equipment

connections and branch line take-offs with 3-elbow swing joints where noted on the drawings.

H. Tee water piping runouts or branches into the side of mains or other branches. Avoid bull-head tees, which are two return lines entering opposite ends of a tee and exiting out the common side.

I. Connect piping to equipment as shown on the drawings. Install components furnished by others such as flow elements (orifice unions), control valve bodies, flow switches, pressure taps with valve, and wells for sensors.

J. Firestopping: Fill openings around uninsulated piping penetrating floors or fire walls, with firestop material. For firestopping insulated piping refer to Section 23 07 11, HVAC AND BOILER PLANT INSULATION.

K. Pipe vents to the exterior. Where a combined vent is provided, the cross-sectional area of the combined vent shall be equal to sum of individual vent areas. Slope vent piping 25 mm (1 inch) in 12 m (40 feet) 0.25 percent in direction of flow. Provide a drip pan elbow on relief valve outlets if the vent rises to prevent backpressure. Terminate vent minimum 300 mm (12 inches) above the roof or through the wall minimum 2.4 m (8 feet) above grade with down turned elbow.

3.2 WELDING

A. The contractor is entirely responsible for the quality of the welding and shall:

1. Conduct tests of the welding procedures used on the project, verify the suitability of the procedures used, verify that the welds made will meet the required tests, and also verify that the welding operators have the ability to make sound welds under standard conditions.
2. Perform all welding operations required for construction and installation of the piping systems.

B. Qualification of Welders: Rules of procedure for qualification of all welders and general requirements for fusion welding shall conform with the applicable portions of ASME B31.1, AWS B2.1/B2.1M, AWS Z49.1, and also as outlined below.

C. Examining Welder: Examine each welder at job site, in the presence of the COR, to determine the ability of the welder to meet the qualifications required. Test welders for piping for all positions,

including welds with the axis horizontal (not rolled) and with the axis vertical. Each welder shall be allowed to weld only in the position in which he has qualified and shall be required to identify his welds with his specific code marking signifying his name and number assigned.

D. Examination Results: Provide the COR with a list of names and corresponding code markings. Retest welders who fail to meet the prescribed welding qualifications. Disqualify welders, who fail the second test, for work on the project.

E. Beveling: Field bevels and shop bevels shall be done by mechanical means or by flame cutting. Where beveling is done by flame cutting, surfaces shall be thoroughly cleaned of scale and oxidation just prior to welding. Conform to specified standards.

F. Alignment: Provide approved welding method for joints on all pipes greater than 50 mm (2 inches) to assure proper alignment, complete weld penetration, and prevention of weld spatter reaching the interior of the pipe.

G. Erection: Piping shall not be split, bent, flattened, or otherwise damaged before, during, or after installation. If the pipe temperature falls to 0 degrees C (32 degrees F) or lower, the pipe shall be heated to approximately 38 degrees C (100 degrees F) for a distance of 300 mm (1 foot) on each side of the weld before welding, and the weld shall be finished before the pipe cools to 0 degrees C (32 degrees F).

H. Non-Destructive Examination of Piping Welds:

1. Perform radiographic examination of 50 percent of the first 10 welds made and 10 percent of all additional welds made. The COR reserves the right to identify individual welds for which the radiographic examination must be performed. All welds will be visually inspected by the COR. The VA reserves the right to require testing on additional welds up to 100 percent if more than 25 percent of the examined welds fail the inspection.
2. An approved independent testing firm regularly engaged in radiographic testing shall perform the radiographic examination of pipe joint welds. All radiographs shall be reviewed and interpreted by an ASNT Certified Level III radiographer, employed by the testing firm, who shall sign the reading report.
3. Comply with ASME B31.1. Furnish a set of films showing each weld inspected, a reading report evaluating the quality of each weld, and

a location plan showing the physical location where each weld is to be found in the completed project. The COR and the commissioning agent shall be given a copy of all reports to be maintained as part of the project records and shall review all inspection records.

I. Defective Welds: Replace and reinspect defective welds. Repairing defective welds by adding weld material over the defect or by peening are prohibited. Welders responsible for defective welds must be requalified prior to resuming work on the project.

J. Electrodes: Electrodes shall be stored in a dry heated area, and be kept free of moisture and dampness during the fabrication operations. Discard electrodes that have lost part of their coating.

3.3 PIPE JOINTS

A. Welded: Beveling, spacing and other details shall conform to ASME B31.1 and AWS B2.1/B2.1M. See Welder's qualification requirements under "Quality Assurance" in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Screwed: Threads shall conform to ASME B1.20.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads on steel pipe with joint compound, or red lead paint for corrosion protection.

C. 125 Pound Cast Steel Flange (Plain Face): Mating flange shall have raised face, if any, removed to avoid overstressing the cast steel flange.

3.4 STEAM TRAP PIPING

A. Install to permit gravity flow to the trap. Provide gravity flow (avoid lifting condensate) from the trap where modulating control valves are used. Support traps weighing over 11 kg (24 pounds) independently of connecting piping.

1. On pipe size 1 ½ inch and above a raised face flange is required to allow for removal of the steam trap without disturbing surrounding piping.
2. On pipe size below 1 ½ inch raised face flanges or unions may be used to allow for removal of the traps.

3.5 SEISMIC BRACING

A. Provide is accordance with Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

3.6 LEAK TESTING

A. Inspect all joints and connections for leaks and workmanship and make corrections as necessary, to the satisfaction of the COR in accordance with the specified requirements. Testing shall be performed in accordance with the specification requirements.

B. An operating test at design pressure, and for hot systems, design maximum temperature.

C. A hydrostatic test at 1.5 times design pressure. For water systems, the design maximum pressure would usually be the static head, or expansion tank maximum pressure, plus pump head. Factory tested equipment (convertors, exchangers, coils, etc.) need not be field tested. Avoid excessive pressure on mechanical seals and safety devices.

D. Prepare and submit test and inspection reports to the COR within 5 working days of test completion and prior to covering the pipe.

E. All tests shall be witnessed by the COR, their representative, or the Commissioning Agent and be documented by each section tested, date tested, and list or personnel present.

3.7 FLUSHING AND CLEANING PIPING SYSTEMS

A. Steam, Condensate and Vent Piping: The piping system shall be flushed clean prior to equipment connection. Cleaning includes pulling all strainer screens and cleaning all scale/dirt legs during startup operation. Contractor shall be responsible for damage caused by inadequately cleaned/flushed systems.

3.8 STARTUP AND TESTING

A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

C. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.

D. Adjust red set hand on pressure gauges to normal working pressure.

3.9 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

3.10 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for 2 hours/ to instruct each VA personnel responsible in operation and maintenance of the system.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

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SECTION 23 23 00
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Field refrigerant piping for direct expansion HVAC systems.

B. Refrigerant piping shall be sized, selected, and designed either by the equipment manufacturer or in strict accordance with the manufacturer's published instructions. The schematic piping diagram shall show all accessories such as, stop valves, level indicators, liquid receivers, oil separator, gauges, thermostatic expansion valves, solenoid valves, moisture separators and driers to make a complete installation.

C. Definitions:

1. Refrigerating system: Combination of interconnected refrigerant-containing parts constituting one closed refrigeration circuit in which a refrigerant is circulated for the purpose of extracting heat.
   a. Low side means the parts of a refrigerating system subjected to evaporator pressure.
   b. High side means the parts of a refrigerating system subjected to condenser pressure.
2. Brazed joint: A gas-tight joint obtained by the joining of metal parts with alloys which melt at temperatures higher than 449 degrees C (840 degrees F) but less than the melting temperatures of the joined parts.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

D. Section 23 07 11, HVAC, and BOILER PLANT INSULATION.

1.3 QUALITY ASSURANCE

A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Comply with ASHRAE Standard 15, Safety Code for Mechanical Refrigeration. The application of this Code is intended to assure the safe design, construction, installation, operation, and inspection of every refrigerating system employing a fluid which normally is vaporized and liquefied in its refrigerating cycle.

C. Comply with ASME B31.5: Refrigerant Piping and Heat Transfer Components.

D. Products shall comply with UL 207 "Refrigerant-Containing Components and Accessories, "Nonelectrical"; or UL 429 "Electrically Operated Valves."

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Shop Drawings:

1. Complete information for components noted, including valves and refrigerant piping accessories, clearly presented, shall be included to determine compliance with drawings and specifications for components noted below:
   a. Tubing and fittings
   b. Valves
   c. Strainers
   d. Moisture-liquid indicators
   e. Filter-driers
   f. Flexible metal hose
   g. Liquid-suction interchanges
   h. Oil separators (when specified)
   i. Gages
   j. Pipe and equipment supports
   k. Refrigerant and oil
   l. Pipe/conduit roof penetration cover
   m. Soldering and brazing materials
2. Layout of refrigerant piping and accessories, including flow capacities, valves locations, and oil traps slopes of horizontal runs, floor/wall penetrations, and equipment connection details.

C. Certification: Copies of certificates for welding procedure, performance qualification record and list of welders' names and symbols.

D. Design Manual: Furnish two copies of design manual of refrigerant valves and accessories.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Conditioning, Heating, and Refrigeration Institute (ARI/AHRI):

495-2005.....Standard for Refrigerant Liquid Receivers

730-2013.....Flow Capacity Rating of Suction-Line Filters and Suction-Line Filter-Driers

750-2016.....Thermostatic Refrigerant Expansion Valves

760-2014.....Performance Rating of Solenoid Valves for Use with Volatile Refrigerants

C. American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE):

15-2019.....Safety Standard for Refrigeration Systems (ANSI)

17-2015.....Method of Testing Capacity of Thermostatic Refrigerant Expansion Valves (ANSI)

63.1-2001.....Method of Testing Liquid Line Refrigerant Driers (ANSI)

63.2-2010.....Method of Testing Liquid Line Filter Drier Filtration Capability (ANSI)

D. American National Standards Institute (ANSI):

A13.1-2015 Scheme for Identification of Piping Systems

Z535.1-2017 .....Safety Color Code

E. American Society of Mechanical Engineers (ASME):

B16.22-2018 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings (ANSI)

B16.24-20016 Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500 (ANSI)

B31.5-2013 Refrigeration Piping and Heat Transfer Components (ANSI)

B40.100-2013.....Pressure Gauges and Gauge Attachments

B40.200-2008.....Thermometers, Direct Reading and Remote Reading

F. American Society for Testing and Materials (ASTM)

A126-2014.....Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

B32-08Standard Specification for Solder Metal

B88-2016.....Standard Specification for Seamless Copper Water Tube

B88M-2018.....Standard Specification for Seamless Copper Water Tube (Metric)

B280-2019.....Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

G. American Welding Society, Inc. (AWS):Brazing Handbook

A5.8/A5.8M-2011.....Standard Specification for Filler Metals for Brazing and Braze Welding

H. Underwriters Laboratories (U.L.):

U.L.207-2018.....Standard for Refrigerant-Containing Components and Accessories, Nonelectrical

U.L.429-2013.....Standard for Electrically Operated Valves

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

A. Refrigerant Piping: For piping up to 100 mm (4 inch) use Copper refrigerant tube, ASTM B280, cleaned, dehydrated and sealed, marked ACR on hard temper straight lengths. Coils shall be tagged ASTM B280 by the manufacturer. For piping over 100 mm (4 inch) use A53 Black SML steel.

B. Water and Drain Piping: Copper water tube, ASTM B88M, Type B or C (ASTM B88, Type M or L). Optional drain piping material: Schedule 80 flame retardant Polypropylene plastic.

C. Fittings, Valves and Accessories:

1. Copper fittings: Wrought copper fittings, ASME B16.22.
   a. Brazed Joints, refrigerant tubing: Cadmium free, AWS A5.8/A5.8M, 45 percent silver brazing alloy, Class BAg-5.
   b. Solder Joints, water and drain: 95-5 tin-antimony, ASTM B32 (95TA).
2. Steel fittings: ASTM wrought steel fittings.
   a. Refrigerant piping – Welded Joints.
3. Flanges and flanged fittings: ASME B16.24.
4. Refrigeration Valves:
   a. Stop Valves: Brass or bronze alloy, pack-less, or packed type with gas tight cap, frost proof, back seating.

b. Pressure Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; UL listed. Forged brass with nonferrous, corrosion resistant internal working parts of high strength, cast iron bodies conforming to ASTM A126, Grade B. Set valves in accordance with ASHRAE Standard 15.
c. Solenoid Valves: Comply with ARI 760 and UL 429, UL-listed, two-position, direct acting or pilot-operated, moisture and vapor-proof type of corrosion resisting materials, designed for intended service, and solder-end connections. Fitted with suitable NEMA 250 enclosure of type required by location and normally closedholding coil.
d. Thermostatic Expansion Valves: Comply with ARI 750. Brass body with stainless-steel or non-corrosive nonferrous internal parts, diaphragm and spring-loaded (direct-operated) type with sensing bulb and distributor having side connection for hot-gas bypass and external equalizer. Size and operating characteristics as recommended by manufacturer of evaporator and factory set for superheat requirements. Solder-end connections. Testing and rating in accordance with ASHRAE Standard 17.
e. Check Valves: Brass or bronze alloy with swing or lift type, with tight closing resilient seals for silent operation; designed for low pressure drop, and with solder-end connections. Direction of flow shall be legibly and permanently indicated on the valve body.

5. Strainers: Designed to permit removing screen without removing strainer from piping system, and provided with screens 80 to 100 mesh in liquid lines DN 25 (NPS 1) and smaller, 60 mesh in liquid lines larger than DN 25 (NPS 1), and 40 mesh in suction lines. Provide strainers in liquid line serving each thermostatic expansion valve, and in suction line serving each refrigerant compressor not equipped with integral strainer.
6. Refrigerant Moisture/Liquid Indicators: Double-ported type having heavy sight glasses sealed into forged bronze body and incorporating means of indicating refrigerant charge and moisture indication. Provide screwed brass seal caps.
7. Refrigerant Filter-Dryers: UL listed, angle or in-line type, as shown on drawings. Conform to ARI Standard 730 and ASHRAE Standard

63.1. Heavy gage steel shell protected with corrosion-resistant paint; perforated baffle plates to prevent desiccant bypass. Size as recommended by manufacturer for service and capacity of system with connection not less than the line size in which installed. Filter driers with replaceable filters shall be furnished with one spare element of each type and size.

8. Flexible Metal Hose: Seamless bronze corrugated hose, covered with bronze wire braid, with standard copper tube ends. Provide in suction and discharge piping of each compressor.
9. Oil Separators: Provide for condensing units, as shown. All welded steel construction with capacity to eliminate a minimum of 95 percent of the oil from the hot gas flowing through it. Provide manufacturer's published ratings for minimum and maximum refrigeration tonnage corresponding to this oil separating efficiency. Separator shall be equipped with a float valve to prevent return of the hot gas to crankcase and shall have isolating stop valves so it can be opened and services without pumping out any other part of the system. ASME construction or UL listed.
10. Receivers: Conform to AHRI 495, steel construction, equipped with taps for liquid inlet and outlet valves, pressure relief valve and liquid level indicator.

2.2 GAGES

A. Temperature Gages: Comply with ASME B40.200. Industrial-duty type and in required temperature range for service in which installed. Gages shall have Celsius scale in 1-degree (Fahrenheit scale in 2-degree) graduations and with black number on a white face. The pointer shall be adjustable. Rigid stem type temperature gages shall be provided in thermal wells located within 1525 mm (5 feet) of the finished floor. Universal adjustable angle type or remote element type temperature gages shall be provided in thermal wells located 1525 to 2135 mm (5 to 7 feet) above the finished floor. Remote element type temperature gages shall be provided in thermal wells located 2135 mm (7 feet) above the finished floor.

B. Vacuum and Pressure Gages: Comply with ASME B40.100 and provide with throttling type needle valve or a pulsation dampener and shut-off valve. Gage shall be a minimum of 90 mm (3-1/2 inches) in diameter with a range from 0 kPa (0 psig) to approximately 1.5 times the maximum

system working pressure. Each gage range shall be selected so that at normal operating pressure, the needle is within the middle-third of the range.

1. Suction: 101 kPa (30 inches Hg) vacuum to 1723 kPa (gage) (250 psig).
2. Discharge: 0 to 3445 kPa (gage) (0 to 500 psig).

2.3 PIPE SUPPORTS

A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

2.4 REFRIGERANTS AND OIL

A. Provide EPA approved refrigerant and oil for proper system operation.

2.5 PIPE INSULATION FOR DX HVAC SYSTEMS

A. Refer to specification Section 23 07 11, HVAC, PLUMBING, and BOILER PLANT INSULATION.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install refrigerant piping and refrigerant containing parts in accordance with ASHRAE Standard 15 and ASME B31.5
   1. Install piping as short as possible, with a minimum number of joints, elbow, and fittings.
   2. Install piping with adequate clearance between pipe and adjacent walls and hangers to allow for service and inspection. Space piping, including insulation, to provide 25 mm (1 inch) minimum clearance between adjacent piping or other surface. Use pipe sleeves through walls, floors, and ceilings, sized to permit installation of pipes with full thickness insulation.
   3. Locate and orient valves to permit proper operation and access for maintenance of packing, seat, and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawing.
   4. Use copper tubing in protective conduit when installed below ground.
   5. Install hangers and supports per ASME B31.5 and the refrigerant piping manufacturer's recommendations.

B. Joint Construction:

1. Brazed Joints: Comply with AWS "Brazing Handbook" and with filler materials complying with AWS A5.8/A5.8M.
   a. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper tubing.
   b. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
   c. Swab fittings and valves with manufacturer's recommended cleaning fluid to remove oil and other compounds prior to installation.
   d. Pass nitrogen gas through the pipe or tubing to prevent oxidation as each joint is brazed. Cap the system with a reusable plug after each brazing operation to retain the nitrogen and prevent entrance of air and moisture.

C. Protect refrigerant system during construction against entrance of foreign matter, dirt, and moisture; have open ends of piping and connections to compressors, condensers, evaporators and other equipment tightly capped until assembly.

D. Pipe relief valve discharge to outdoors for systems containing more than 45 kg (100 lbs) of refrigerant.

E. Firestopping: Fill openings around uninsulated piping penetrating floors or fire walls, with firestop material. For firestopping insulated piping refer to Section 23 07 11, HVAC, and BOILER PLANT INSULATION.

F. Seismic Bracing: Refer to specification Section 13 05 41, SEISMIC RESTRAINTS REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS, for bracing of piping in seismic areas.

3.2 PIPE AND TUBING INSULATION

A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Apply two coats of weather-resistant finish as recommended by the manufacturer to insulation exposed to outdoor weather.

3.3 SIGNS AND IDENTIFICATION

A. Each refrigerating system erected on the premises shall be provided with an easily legible permanent sign securely attached and easily accessible, indicating thereon the name and address of the installer, the kind and total number of pounds of refrigerant required in the system for normal operations, and the field test pressure applied.

B. Systems containing more than 50 kg (110 lb) of refrigerant shall be provided with durable signs, in accordance with ANSI A13.1 and ANSI

Z535.1, having letters not less than 13 mm (1/2 inch) in height designating:

1. Valves and switches for controlling refrigerant flow, the ventilation and the refrigerant compressor(s).
2. Signs on all exposed high pressure and low pressure piping installed outside the machinery room, with name of the refrigerant and the letters "HP" or "LP".

3.4 FIELD QUALITY CONTROL

A. Prior to initial operation examine and inspect piping system for conformance to plans and specifications and ASME B31.5. Correct equipment, material, or work rejected because of defects or nonconformance with plans and specifications, and ANSI codes for pressure piping.

B. After completion of piping installation and prior to initial operation, conduct test on piping system according to ASME B31.5. Furnish materials and equipment required for tests. Perform tests in the presence of the VA COR. If the test fails, correct defects and perform the test again until it is satisfactorily done and all joints are proved tight.

1. Every refrigerant-containing parts of the system that is erected on the premises, except compressors, condensers, evaporators, safety devices, pressure gages, control mechanisms and systems that are factory tested, shall be tested and proved tight after complete installation, and before operation.
2. The high and low side of each system shall be tested and proved tight at not less than the lower of the design pressure or the setting of the pressure-relief device protecting the high or low side of the system, respectively, except systems erected on the premises using non-toxic and non-flammable Group A1 refrigerants with copper tubing not exceeding DN 18 (NPS 5/8). This may be tested by means of the refrigerant charged into the system at the saturated vapor pressure of the refrigerant at 20 degrees C (68 degrees F) minimum.

C. Test Medium: A suitable dry gas such as nitrogen or shall be used for pressure testing. The means used to build up test pressure shall have either a pressure-limiting device or pressure-reducing device with a pressure-relief device and a gage on the outlet side. The pressure

relief device shall be set above the test pressure but low enough to prevent permanent deformation of the system components.

3.5 SYSTEM TEST AND CHARGING

A. System Test and Charging: As recommended by the equipment manufacturer or as follows:

1. Connect a drum of refrigerant to charging connection and introduce enough refrigerant into system to raise the pressure to 70 kPa (10 psi) gage. Close valves and disconnect refrigerant drum. Test system for leaks with halide test torch or other approved method suitable for the test gas used. Repair all leaking joints and retest.
2. Connect a drum of dry nitrogen to charging valve and bring test pressure to design pressure for low side and for high side. Test entire system again for leaks.
3. Evacuate the entire refrigerant system by the triplicate evacuation method with a vacuum pump equipped with an electronic gage reading in mPa (microns). Pull the system down to 665 mPa (500 microns) 665 mPa (2245.6 inches of mercury at 60 degrees F) and hold for four hours then break the vacuum with dry nitrogen (or refrigerant). Repeat the evacuation two more times breaking the third vacuum with the refrigeration to be charged and charge with the proper volume of refrigerant.

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SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Ductwork and accessories for HVAC including the following:
   1. Supply air, return air, outside air, exhaust, make-up air, and relief systems.

B. Definitions:
   1. SMACNA Standards as used in this specification means the HVAC Duct Construction Standards, Metal and Flexible.
   2. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams, and connections to an acceptable minimum.
   3. Duct Pressure Classification: SMACNA HVAC Duct Construction Standards, Metal and Flexible.
   4. Exposed Duct: Exposed to view in a finished room.

1.2 RELATED WORK

A. Fire Stopping Material: Section 07 84 00, FIRESTOPPING.

B. Seismic Reinforcing: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

C. General Mechanical Requirements: Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

D. Noise Level Requirements: Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

E. Duct Insulation: Section 23 07 11, HVAC, PLUMBING, and BOILER PLANT INSULATION

F. Air Flow Control Valves and Terminal Units: Section 23 36 00, AIR TERMINAL UNITS.

G. Supply Air Fans: Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

H. Return Air and Exhaust Air Fans: Section 23 34 00, HVAC FANS.

I. Air Filters and Filters' Efficiencies: Section 23 40 00, HVAC AIR CLEANING DEVICES.

J. Duct Mounted Instrumentation: Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

K. Testing and Balancing of Air Flows: Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

1.3 QUALITY ASSURANCE

A. Refer to article, QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

B. Fire Safety Code: Comply with NFPA 90A.

C. Duct System Construction and Installation: Referenced SMACNA Standards are the minimum acceptable quality.

D. Duct Sealing, Air Leakage Criteria, and Air Leakage Tests: Ducts shall be sealed as per duct sealing requirements of SMACNA HVAC Air Duct Leakage Test Manual for duct pressure classes shown on the drawings.

E. Duct accessories exposed to the air stream, such as dampers of all types (except smoke dampers) and access openings, shall be of the same material as the duct or provide at least the same level of corrosion resistance.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data:

1. Rectangular ducts:
   a. Schedules of duct systems, materials and selected SMACNA construction alternatives for joints, sealing, gage, and reinforcement.
   b. Duct liner.
   c. Sealants and gaskets.
   d. Access doors.
2. Round and flat oval duct construction details:
   a. Manufacturer's details for duct fittings.
   b. Duct liner.
   c. Sealants and gaskets.
   d. Access sections.
   e. Installation instructions.
3. Volume dampers, back draft dampers.
4. Upper hanger attachments.
5. Fire dampers, fire doors, and smoke dampers with installation instructions.
6. Sound attenuators, including pressure drop and acoustic performance.
7. Flexible ducts and clamps, with manufacturer's installation instructions.

8. Flexible connections.
9. Instrument test fittings.
10. Details and design analysis of alternate or optional duct systems.
11. COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

C. Coordination Drawings: Refer to article, SUBMITTALS, in Section 23 05 11 – Common Work Results for HVAC and Steam Generation.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Civil Engineers (ASCE):

ASCE7-05.....Minimum Design Loads for Buildings and Other Structures

C. American Society for Testing and Materials (ASTM):

A167-99(2009).....Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A653-09.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy coated (Galvannealed) by the Hot-Dip process

A1011-09a.....Standard Specification for Steel, Sheet and Strip, Hot rolled, Carbon, structural, High-Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength

B209-07.....Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C1071-05e1.....Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)

E84-09a.....Standard Test Method for Surface Burning Characteristics of Building Materials

D. National Fire Protection Association (NFPA):

90A-09.....Standard for the Installation of Air Conditioning and Ventilating Systems

96-08.....Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

2nd Edition – 2005.....HVAC Duct Construction Standards, Metal and Flexible

1st Edition - 1985.....HVAC Air Duct Leakage Test Manual

6th Edition – 2003.....Fibrous Glass Duct Construction Standards

F. Underwriters Laboratories, Inc. (UL):

181-08.....Factory-Made Air Ducts and Air Connectors

555-06 .....Standard for Fire Dampers

555S-06 .....Standard for Smoke Dampers

PART 2 - PRODUCTS

2.1 DUCT MATERIALS AND SEALANTS

A. General: Except for systems specified otherwise, construct ducts, casings, and accessories of galvanized sheet steel, ASTM A653, coating G90; or, aluminum sheet, ASTM B209, alloy 1100, 3003 or 5052.

B. Specified Corrosion Resistant Systems: Stainless steel sheet, ASTM A167, Class 302 or 304, Condition A (annealed) Finish No. 4 for exposed ducts and Finish No. 2B for concealed duct or ducts located in mechanical rooms.

C. Optional Duct Materials:

1. Grease Duct: Double wall factory-built grease duct, UL labeled and complying with NFPA 96 may be furnished in lieu of specified materials for kitchen and grill hood exhaust duct. Installation and accessories shall comply with the manufacturers catalog data. Outer jacket of exposed ductwork shall be stainless steel. Square and rectangular duct shown on the drawings will have to be converted to equivalent round size.

D. Joint Sealing: Refer to SMACNA HVAC Duct Construction Standards, paragraph S1.9.

1. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread, and 50 smoke developed (dry state) compounded specifically for sealing ductwork as recommended by the manufacturer. Generally provide liquid sealant, with or without compatible tape, for low clearance slip joints and heavy, permanently elastic, mastic type where clearances are larger. Oil base caulking and glazing compounds are not acceptable because they do not retain elasticity and bond.

2. Tape: Use only tape specifically designated by the sealant manufacturer and apply only over wet sealant. Pressure sensitive tape shall not be used on bare metal or on dry sealant.
3. Gaskets in Flanged Joints: Soft neoprene.

E. Approved factory-made joints may be used.

2.2 DUCT CONSTRUCTION AND INSTALLATION

A. Regardless of the pressure classifications outlined in the SMACNA Standards, fabricate, and seal the ductwork in accordance with the following pressure classifications:

B. Duct Pressure Classification:

0 to 50 mm (2 inch)

> 50 mm to 75 mm (2 inch to 3 inch)

> 75 mm to 100 mm (3 inch to 4 inch)

Show pressure classifications on the floor plans.

C. Seal Class: All ductwork shall receive Class A Seal

D. Round and Flat Oval Ducts: Furnish duct and fittings made by the same manufacturer to insure good fit of slip joints. When submitted and approved in advance, round, and flat oval duct, with size converted on the basis of equal pressure drop, may be furnished in lieu of rectangular duct design shown on the drawings.

1. Elbows: Diameters 80 through 200 mm (3 through 8 inches) shall be two sections die stamped, all others shall be gored construction, maximum 18-degree angle, with all seams continuously welded or standing seam. Coat galvanized areas of fittings damaged by welding with corrosion resistant aluminum paint or galvanized repair compound.
2. Provide bell mouth, conical tees or taps, laterals, reducers, and other low loss fittings as shown in SMACNA HVAC Duct Construction Standards.
3. Ribbed Duct Option: Lighter gage round/oval duct and fittings may be furnished provided certified tests indicating that the rigidity and performance is equivalent to SMACNA standard gage ducts are submitted.
   a. Ducts: Manufacturer's published standard gage, G90 coating, spiral lock seam construction with an intermediate standing rib.
   b. Fittings: May be manufacturer's standard as shown in published catalogs, fabricated by spot welding and bonding with neoprene

base cement or machine formed seam in lieu of continuous welded seams.

4. Provide flat side reinforcement of oval ducts as recommended by the manufacturer and SMACNA HVAC Duct Construction Standard S3.13. Because of high pressure loss, do not use internal tie-rod reinforcement unless approved by the Resident Engineer.

E. Casings and Plenums: Construct in accordance with SMACNA HVAC Duct Construction Standards Section 6, including curbs, access doors, pipe penetrations, eliminators and drain pans. Access doors shall be hollow metal, insulated, with latches and door pulls, 500 mm (20 inches) wide by 1200 - 1350 mm (48 - 54 inches) high. Provide view port in the doors where shown. Provide drain for outside air louver plenum. Outside air plenum shall have exterior insulation. Drain piping shall be routed to the nearest floor drain.

F. Volume Dampers: Single blade or opposed blade, multi-louver type as detailed in SMACNA Standards. Refer to SMACNA Detail Figure 2-12 for Single Blade and Figure 2.13 for Multi-blade Volume Dampers.

G. Duct Hangers and Supports: Refer to SMACNA Standards Section IV. Avoid use of trapeze hangers for round duct.

2.4 DUCT ACCESS DOORS, PANELS AND SECTIONS

A. Provide access doors, sized, and located for maintenance work, upstream, in the following locations:

1. Each duct mounted coil and humidifier.
2. Each fire damper (for link service), smoke damper and automatic control damper.
3. Each duct mounted smoke detector.
4. For cleaning operating room supply air duct and kitchen hood exhaust duct, locate access doors at 6 m (20 feet) intervals and at each change in duct direction.

B. Openings shall be as large as feasible in small ducts, 300 mm by 300 mm (12 inch by 12 inch) minimum where possible. Access sections in insulated ducts shall be double-wall, insulated. Transparent shatterproof covers are preferred for uninsulated ducts.

1. For rectangular ducts: Refer to SMACNA HVAC Duct Construction Standards (Figure 2-12).
2. For round and flat oval duct: Refer to SMACNA HVAC duct Construction Standards (Figure 2-11).

2.5 FIRE DAMPERS

A. Galvanized steel, interlocking blade type, UL listing and label, 1-1/2 hour rating, 70 degrees C (160 degrees F) fusible line, 100 percent free opening with no part of the blade stack or damper frame in the air stream.

B. Fire dampers in wet air exhaust shall be of stainless-steel construction, all others may be galvanized steel.

C. Minimum requirements for fire dampers:

1. The damper frame may be of design and length as to function as the mounting sleeve, thus eliminating the need for a separate sleeve, as allowed by UL 555. Otherwise provide sleeves and mounting angles, minimum 1.9 mm (14 gage), required to provide installation equivalent to the damper manufacturer's UL test installation.
2. Submit manufacturer's installation instructions conforming to UL rating test.

2.6 SMOKE DAMPERS

A. Maximum air velocity, through free area of open damper, and pressure loss: Low pressure and medium pressure duct (supply, return, exhaust, outside air): 450 m/min (1500 fpm). Maximum static pressure loss: 32 Pa (0.13 inch W.G.).

B. Maximum air leakage, closed damper: 0.32 cubic meters /min/square meter (4.0 CFM per square foot) at 750 Pa (3 inch W.G.) differential pressure.

C. Minimum requirements for dampers:

1. Shall comply with requirements of Table 6-1 of UL 555S, except for the Fire Endurance and Hose Stream Test.
2. Frame: Galvanized steel channel with side, top and bottom stops or seals.
3. Blades: Galvanized steel, parallel type preferably, 300 mm (12 inch) maximum width, edges sealed with neoprene, rubber or felt, if required to meet minimum leakage. Airfoil (streamlined) type for minimum noise generation and pressure drop are preferred for duct mounted dampers.
4. Shafts: Galvanized steel.
5. Bearings: Nylon, bronze sleeve or ball type.
6. Hardware: Zinc plated.

7. Operation: Automatic open/close. No smoke damper that requires manual reset or link replacement after actuation is acceptable. See drawings for required control operation.

D. Motor operator (actuator): Provide pneumatic or electric as required by the automatic control system, externally mounted on stand-offs to allow complete insulation coverage.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

A. Combination fire and smoke dampers: Multi-blade type units meeting all requirements of both fire dampers and smoke dampers shall be used where shown and may be used at the Contractor's option where applicable.

2.8 FIRE DOORS

A. Galvanized steel, interlocking blade type, UL listing and label, 71 degrees C (160 degrees F) fusible link, 3 hour rating and approved for openings in Class A fire walls with rating up to 4 hours, 100 percent free opening with no part of the blade stack or damper frame in the air stream.

2.10 FLEXIBLE DUCT CONNECTIONS

A. Where duct connections are made to fans, air terminal units, and air handling units, install a non-combustible flexible connection of 822 g (29 ounce) neoprene coated fiberglass fabric approximately 150 mm (6 inches) wide. For connections exposed to sun and weather provide hypalon coating in lieu of neoprene. Burning characteristics shall conform to NFPA 90A. Securely fasten flexible connections to round ducts with stainless steel or zinc-coated iron draw bands with worm gear fastener. For rectangular connections, crimp fabric to sheet metal and fasten sheet metal to ducts by screws 50 mm (2 inches) on center. Fabric shall not be stressed other than by air pressure. Allow at least 25 mm (one inch) slack to ensure that no vibration is transmitted.

2.12 PREFABRICATED ROOF CURBS

A. Galvanized steel or extruded aluminum 300 mm (12 inches) above finish roof service, continuous welded corner seams, treated wood nailer, 40 mm (1-1/2 inch) thick, 48 kg/cubic meter (3 pound/cubic feet) density rigid mineral fiberboard insulation with metal liner, built-in cant strip (except for gypsum or tectum decks). For surface insulated roof deck, provide raised cant strip (recessed mounting flange) to start at the upper surface of the insulation. Curbs shall be constructed for pitched roof or ridge mounting as required to keep top of curb level.

2.13 FIRESTOPPING MATERIAL

A. Refer to Section 07 84 00, FIRESTOPPING.

2.14 SEISMIC RESTRAINT FOR DUCTWORK

A. Refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

2.15 DUCT MOUNTED THERMOMETER (AIR)

A. Stem Type Thermometers: ASTM E1, 7 inch scale, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear glass or polycarbonate window, brass stem, 2 percent of scale accuracy to ASTM E77 scale calibrated in degrees Fahrenheit.

B. Thermometer Supports:

1. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
2. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.16 DUCT MOUNTED TEMPERATURE SENSOR (AIR)

A. Refer to Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.17 INSTRUMENT TEST FITTINGS

A. Manufactured type with a minimum 50 mm (two inch) length for insulated duct, and a minimum 25 mm (one inch) length for duct not insulated. Test hole shall have a flat gasket for rectangular ducts and a concave gasket for round ducts at the base, and a screw cap to prevent air leakage.

B. Provide instrument test holes at each duct or casing mounted temperature sensor or transmitter, and at entering and leaving side of each heating coil, cooling coil, and heat recovery unit.

2.18 AIR FLOW CONTROL VALVES (AFCV)

A. Refer to Section 23 36 00 AIR TERMINAL UNITS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with provisions of Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION, particularly regarding coordination with other trades and work in existing buildings.

B. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards:

1. Drawings show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, boxes, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets at no additional cost to the government. Coordinate with other trades for space available and relative location of HVAC equipment and accessories on ceiling grid. Duct sizes on the drawings are inside dimensions which shall be altered by Contractor to other dimensions with the same air handling characteristics where necessary to avoid interferences and clearance difficulties.
2. Provide duct transitions, offsets and connections to dampers, coils, and other equipment in accordance with SMACNA Standards, Section II. Provide streamliner when an obstruction cannot be avoided and must be taken in by a duct. Repair galvanized areas with galvanizing repair compound.
3. Provide bolted construction and tie-rod reinforcement in accordance with SMACNA Standards.
4. Construct casings, eliminators, and pipe penetrations in accordance with SMACNA Standards, Chapter 6. Design casing access doors to swing against air pressure so that pressure helps to maintain a tight seal.

C. Install duct hangers and supports in accordance with SMACNA Standards, Chapter 4.

D. Install fire dampers, smoke dampers and combination fire/smoke dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test. Install fire dampers, smoke dampers and combination fire/smoke dampers at locations indicated and where ducts penetrate fire rated and/or smoke rated walls, shafts and where required by the Resident Engineer. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges per UL and NFPA. Demonstrate re-setting of fire dampers and operation of smoke dampers to the Resident Engineer.

E. Seal openings around duct penetrations of floors and fire rated partitions with fire stop material as required by NFPA 90A.

F. Flexible duct installation: Refer to SMACNA Standards, Chapter 3. Ducts shall be continuous, single pieces not over 1.5 m (5 feet) long (NFPA 90A), as straight and short as feasible, adequately supported. Centerline radius of bends shall be not less than two duct diameters. Make connections with clamps as recommended by SMACNA. Clamp per SMACNA with one clamp on the core duct and one on the insulation jacket. Flexible ducts shall not penetrate floors, or any chase or partition designated as a fire or smoke barrier, including corridor partitions fire rated one hour or two hour. Support ducts SMACNA Standards.

G. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, paint the inside of the duct with flat black paint to reduce visibility.

H. Control Damper Installation:

1. Provide necessary blank-off plates required to install dampers that are smaller than duct size. Provide necessary transitions required to install dampers larger than duct size.
2. Assemble multiple sections dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.
3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.
4. Install all damper control/adjustment devices on stand-offs to allow complete coverage of insulation.

I. Air Flow Measuring Devices (AFMD): Install units with minimum straight run distances, upstream and downstream as recommended by the manufacturer.

J. Low Pressure Duct Liner: Install in accordance with SMACNA, Duct Liner Application Standard.

K. Protection and Cleaning: Adequately protect equipment and materials against physical damage. Place equipment in first class operating condition or return to source of supply for repair or replacement, as determined by Resident Engineer. Protect equipment and ducts during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting. When new ducts are connected to existing ductwork, clean both new and existing

ductwork by mopping and vacuum cleaning inside and outside before operation.

3.2 DUCT LEAKAGE TESTS AND REPAIR

A. Ductwork leakage testing shall be performed by the Testing and Balancing Contractor directly contracted by the General Contractor and independent of the Sheet Metal Contractor.

B. Ductwork leakage testing shall be performed for the entire air distribution system (including all supply, return, exhaust and relief ductwork), section by section, including fans, coils and filter sections. Based upon satisfactory initial duct leakage test results, the scope of the testing may be reduced by the COR on ductwork constructed to the 500 Pa (2" WG) duct pressure classification. In no case shall the leakage testing of ductwork constructed above the 500 Pa (2" WG) duct pressure classification or ductwork located in shafts or other inaccessible areas be eliminated.

C. Test procedure, apparatus and report shall conform to SMACNA Leakage Test manual. The maximum leakage rate allowed is 4 percent of the design air flow rate.

D. All ductwork shall be leak tested first before enclosed in a shaft or covered in other inaccessible areas.

E. All tests shall be performed in the presence of the Resident Engineer and the Test and Balance agency. The Test and Balance agency shall measure and record duct leakage and report to the Resident Engineer and identify leakage source with excessive leakage.

F. If any portion of the duct system tested fails to meet the permissible leakage level, the Contractor shall rectify sealing of ductwork to bring it into compliance and shall retest it until acceptable leakage is demonstrated to the Resident Engineer.

G. All tests and necessary repairs shall be completed prior to insulation or concealment of ductwork.

H. Make sure all openings used for testing flow and temperatures by TAB Contractor are sealed properly.

3.4 TESTING, ADJUSTING AND BALANCING (TAB)

Refer to Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

3.5 OPERATING AND PERFORMANCE TESTS

Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

---END---

SECTION 23 34 00
HVAC FANS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Fans for heating, ventilating and air conditioning.

B. Product Definitions: AMCA Publication 99, Standard l-66.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

C. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

D. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

E. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION EQUIPMENT.

F. Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

G. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

H. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

I. Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

I. Section 23 82 16, AIR COILS.

J. Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS.

1.3 QUALITY ASSURANCE

A. Refer to paragraph, QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Fans and power ventilators shall be listed in the current edition of AMCA 26l and shall bear the AMCA performance seal.

C. Operating Limits for Centrifugal Fans: AMCA 99 (Class I, II, and III).

D. Fans and power ventilators shall comply with the following standards:

1. Testing and Rating: AMCA 2l0.

2. Sound Rating: AMCA 300.

E. Vibration Tolerance for Fans and Power Ventilators: Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

F. Performance Criteria:

1. The fan schedule shall show the design air volume and static pressure. Select the fan motor HP by increasing the fan BHP by 10 percent to account for the drive losses and field conditions.

2. Select the fan operating point as follows:

a. Forward Curve and Axial Flow Fans: Right hand side of peak pressure point
b. Air Foil, Backward Inclined, or Tubular: At or near the peak static efficiency

G. Safety Criteria: Provide manufacturer's standard screen on fan inlet and discharge where exposed to operating and maintenance personnel.

H. Corrosion Protection:

1. Except for fans in fume hood exhaust service, all steel shall be mill-galvanized, or phosphatized and coated with minimum two coats, corrosion resistant enamel paint. Manufacturers paint and paint system shall meet the minimum specifications of: ASTM D1735 water fog; ASTM B117 salt spray; ASTM D3359 adhesion; and ASTM G152 and G153 for carbon arc light apparatus for exposure of non-metallic material.
2. Fans for general purpose fume hoods, or chemical hoods, and radioisotope hoods shall be constructed of materials compatible with the chemicals being transported in the air through the fan.

I. Spark resistant construction: If flammable gas, vapor, or combustible dust is present in concentrations above 20% of the Lower Explosive Limit (LEL), the fan construction shall be as recommended by AMCA's Classification for Spark Resistant Construction. Drive set shall be comprised of non-static belts for use in an explosive.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturers Literature and Data:

1. Fan sections, motors, and drives.
2. Centrifugal fans, motors, drives, accessories, and coatings.
   a. In-line centrifugal fans.
   b. Tubular Centrifugal Fans.
   c. Industrial fans.
3. Propeller fans.

C. Certified Sound power levels for each fan.

D. Motor ratings types, electrical characteristics, and accessories.

E. Roof curbs.

F. Belt guards.

G. Maintenance and Operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

H. Certified fan performance curves for each fan showing cubic feet per minute (CFM) versus static pressure, efficiency, and horsepower for design point of operation.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Movement and Control Association International, Inc. (AMCA):

99-2016.....Standards Handbook

210-2016.....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating

300-2014.....Reverberant Room Method for Sound Testing of Fans

C. American Society for Testing and Materials (ASTM):

B117-2019.....Standard Practice for Operating Salt Spray (Fog) Apparatus

D1735-2014.....Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

D3359-2017.....Standard Test Methods for Measuring Adhesion by Tape Test

G152-2013.....Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Non-Metallic Materials

G153-2013.....Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Non-Metallic Materials

D. National Fire Protection Association (NFPA):

NFPA 96-2017.....Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

E. National Sanitation Foundation (NSF):

37-2017.....Air Curtains for Entrance Ways in Food and Food Service Establishments

F. Underwriters Laboratories, Inc. (UL):

181-2013.....Factory Made Air Ducts and Air Connectors

1.6 EXTRA MATERIALS

A. Provide one additional set of belts for all belt-driven fans.

PART 2 - PRODUCTS

2.1 FAN SECTION (CABINET FAN)

A. Refer to specification Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

2.2 CENTRIFUGAL FANS

A. Standards and Performance Criteria: Refer to Paragraph, QUALITY ASSURANCE. Record factory vibration test results on the fan or furnish to the Contractor.

B. Fan arrangement, unless noted or approved otherwise:
   1. DWDl fans: Arrangement 3.
   2. SWSl fans: Arrangement l, 3, 9 or l0.

C. Construction: Wheel diameters and outlet areas shall be in accordance with AMCA standards.
   1. Housing: Low carbon steel, arc welded throughout, braced and supported by structural channel or angle iron to prevent vibration or pulsation, flanged outlet, inlet fully streamlined. Provide lifting clips, and casing drain. Provide manufacturer's standard access door. Provide 12.5 mm (1/2 inches) wire mesh screens for fan inlets without duct connections.
   2. Wheel: Steel plate with die formed blades welded or riveted in place, factory balanced statically and dynamically.
   3. Shaft: Designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fans class.
   4. Bearings: Heavy duty ball or roller type sized to produce a Bl0 life of not less than 50,000 hours, and an average fatigue life of 200,000 hours. Extend filled lubrication tubes for interior bearings or ducted units to outside of housing.
   5. Belts: Oil resistant, non-sparking and non-static.
   6. Belt Drives: Factory installed with final alignment belt adjustment made after installation.
   7. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15HP, fixed pitch for use with motors larger than 15HP. Select pulleys so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

8. Motor, adjustable motor base, drive and guard: Furnish from factory with fan. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC for specifications. Provide protective sheet metal enclosure for fans located outdoors.
9. Furnish variable speed fan motor controllers where shown on the drawings. Refer to Section 26 29 11, MOTOR STARTERS. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC for controller/motor combination requirements.

D. In-line Centrifugal Fans: In addition to the requirements of paragraphs A and 2.2.C3 thru 2.2.C9, provide minimum 18 Gauge galvanized steel housing with inlet and outlet flanges, backward inclined aluminum centrifugal fan wheel, bolted access door and supports as required. Motors shall be factory pre-wired to an external junction box. Provide factory wired disconnect switch.

E. Tubular Centrifugal Fans: In addition to the requirements of paragraphs A and 2.2.C2 thru 2.2.C9 provide;
1. Housings: Hot rolled steel, one-piece design, incorporating integral guide vanes, motor mounts, bolted access hatch and end flanges. Provide spun inlet bell and screen for unducted inlet and screen for unducted outlet. Provide welded steel, flanged inlet and outlet cones for ducted connection. Provide mounting legs or suspension brackets as required for support. Guide vanes shall straighten the discharge air pattern to provide linear flow.

F. Industrial Fans: Use where scheduled or in lieu of centrifugal fans for low volume high static service. Construction specifications paragraphs A and C for centrifugal fans shall apply. Provide material handling flat blade type fan wheel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fan, motor, and drive in accordance with manufacturer's instructions.

B. Align fan and motor sheaves to allow belts to run true and straight.

C. Bolt equipment to curbs with galvanized lag bolts.

D. Install vibration control devices as shown on drawings and specified in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

3.2 PRE-OPERATION MAINTENANCE

A. Lubricate bearings, pulleys, belts and other moving parts with manufacturer recommended lubricants.

B. Rotate impeller by hand and check for shifting during shipment and check all bolts, collars, and other parts for tightness.

C. Clean fan interiors to remove foreign material and construction dirt and dust.

3.3 START-UP AND INSTRUCTIONS

A. Verify operation of motor, drive system and fan wheel according to the drawings and specifications.

B. Check vibration and correct as necessary for air balance work.

C. After air balancing is complete and permanent sheaves are in place perform necessary field mechanical balancing to meet vibration tolerance in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

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SECTION 23 36 00
AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Air terminal units, air flow control valves.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

D. Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

E. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

F. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

G. Section 23 31 00, HVAC DUCTS and CASINGS.

H. Section 23 82 16, AIR COILS.

1.3 QUALITY ASSURANCE

A. Refer to Article, QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data:

1. Air Terminal Units: Submit test data.
2. Air flow control valves.

C. Samples: Provide one typical air terminal unit for approval by the COR. This unit will be returned to the Contractor after all similar units have been shipped and deemed acceptable at the job site.

D. Certificates:

1. Compliance with Article, QUALITY ASSURANCE.
2. Compliance with specified standards.

E. Operation and Maintenance Manuals: Submit in accordance with paragraph, INSTRUCTIONS, in Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Conditioning and Refrigeration Institute (AHRI)/(ARI):
880-2017.....Performance Rating of Air Terminals

C. National Fire Protection Association (NFPA):
90A-2018.....Standard for the Installation of Air Conditioning and Ventilating Systems

D. Underwriters Laboratories, Inc. (UL):
181-2013.....Standard for Factory-Made Air Ducts and Air Connectors

E. American Society for Testing and Materials (ASTM):
C 665-200617.....Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

1.6 GUARANTY

A. In accordance with the GENERAL CONDITIONS

PART 2 - PRODUCTS

2.1 GENERAL

A. Coils:

B. Labeling: Control box shall be clearly marked with an identification label that lists such information as nominal CFM, maximum and minimum factory-set airflow limits, coil type and coil connection orientation, where applicable.

C. Factory calibrate air terminal units to air flow rate indicated. All settings including maximum and minimum air flow shall be field adjustable.

D. Dampers with internal air volume control: See section 23 31 00 HVAC DUCTS and CASINGS.

E. Terminal Sound Attenuators: See Section 23 31 00 HVAC DUCTS and CASINGS.

2.2 AIR TERMINAL UNITS (BOXES)

A. General: Factory built, pressure independent units, factory set-field adjustable air flow rate, suitable for single duct applications. Use of dual-duct air terminal units is not permitted. Clearly show on each unit the unit number and factory set air volumes corresponding to the contract drawings. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC work assumes factory set air volumes. Coordinate flow controller sequence and damper operation details with the drawings and

Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. All air terminal units shall be brand new products of the same manufacturer.

B. Capacity and Performance: The Maximum Capacity of a single terminal unit shall not exceed 566 Liters/second (1,200 CFM) with the exception of operating rooms and Cystoscopy rooms, which shall be served by a single air terminal unit at a maximum of 1,250 Liters/second (3,000 CFM).

C. Sound Power Levels:

Acoustic performance of the air terminal units shall be based on the design noise levels for the spaces stipulated in Section 23 05 41 Noise and Vibration Control for HVAC Piping and Equipment. Equipment schedules shall show the sound power levels in all octave bands. Terminal sound attenuators shall be provided, as required, to meet the intent of the design.

D. Casing: Unit casing shall be constructed of galvanized steel no lighter than 0.85 mm (22 Gauge). Air terminal units serving the operating rooms and Cystoscopy rooms shall be fabricated without lining. Provide hanger brackets for attachment of supports.

1. Lining material: Suitable to provide required acoustic performance, thermal insulation and prevent sweating. Meet the requirements of NFPA 90A and comply with UL 181 for erosion as well as ASTMC 665 antimicrobial requirements. Insulation shall consist of 13 mm (1/2 IN) thick non-porous foil faced rigid fiberglass insulation of 4-lb/cu.ft, secured by full length galvanized steel z-strips which enclose and seal all edges. Tape and adhesives shall not be used. Materials shall be non-friable and with surfaces, including all edges, fully encapsulated and faced with perforated metal or coated so that the air stream will not detach material. No lining material is permitted in the boxes serving operating rooms and Cystoscopy rooms.
2. Access panels (or doors): Provide panels large enough for inspection, adjustment and maintenance without disconnecting ducts, and for cleaning heating coils attached to unit, even if there are no moving parts. Panels shall be insulated to same standards as the rest of the casing and shall be secured and gasketed airtight. It shall require no tool other than a screwdriver to remove.

3. Total leakage from casing: Not to exceed 2 percent of the nominal capacity of the unit when subjected to a static pressure of 750 Pa (3-inch WG), with all outlets sealed shut and inlets fully open.
4. Octopus connector: Factory installed, lined air distribution terminal. Provide where flexible duct connections are shown on the drawings connected directly to terminals. Provide butterfly-balancing damper, with locking means in connectors with more than one outlet. Octopus connectors and flexible connectors are not permitted in the Surgical Suite.

E. Construct dampers and other internal devices of corrosion resisting materials which do not require lubrication or other periodic maintenance.
   1. Damper Leakage: Not greater than 2 percent of maximum rated capacity, when closed against inlet static pressure of 1 kPa (4-inch WG).
F. Provide multi-point velocity pressure sensors with external pressure taps.
   1. Provide direct reading air flow rate table pasted to box.
G. Provide static pressure tubes.
H. Externally powered DDC variable air volume controller and damper actuator to be furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC for factory mounting on air terminal units. The DDC controller shall be electrically actuated.

2.3 AIR FLOW CONTROL VALVE (AFCV)

A. Airflow control device shall be a venturi valve type air flow control valve.
B. Pressure independent over a 150 Pa-750 Pa (0.6-inch WG – 3.0-inch WG) drop across valve.
C. Volume control accurate to plus or minus 5% of airflow over an airflow turndown range of 16 to 1. No minimum entrance or exit duct diameters shall be required to ensure accuracy or pressure independence.
D. Response time to change in command signal and duct static pressure within three seconds.
E. 16 gauge spun aluminum valve body and control device with continuous welded seam and 316 stainless steel shaft and shaft support brackets. Pressure independent springs shall be stainless steel. Shaft bearing surfaces shall be Teflon or polyester.

F. 316 stainless steel continuous welded seam valve body, control device, shaft, shaft support bracket, pivot arm and internal mounting link. The control device shall have a baked-on corrosion resistant phenolic coating. The shaft shall have a Teflon coating and all shaft bearing surfaces shall be made of Teflon. The pressure independent springs shall be made of stainless steel.

G. The airflow device shall have no exposed aluminum or stainless-steel components. The shaft support brackets, pivot arm, internal mounting link, and pressure independent springs shall have a baked-on corrosion resistant phenolic coating. Internal nuts, bolts, and rivets shall be titanium or phenolic coated stainless steel.

H. Constant volume units:
   1. Actuator to be factory mounted to the valve.
   2. Closed loop control of airflow by way of flow feedback signal with less than 1 second response time.
   3. Shaft positioned using direct potentiometer measurement to produce a linear factory calibrated feedback.
   4. The maximum and minimum airflows shall be as scheduled.

I. Variable volume units:
   1. Actuator to be factory mounted to the valve.
   2. Closed loop control of airflow by way of flow feedback signal with less than 1 second response time.
   3. Shaft positioned using direct potentiometer measurement to produce a linear factory calibrated feedback.

J. Certification:
   1. Control device: factory calibrated to airflows detailed on plans using NIST traceable air stations and instrumentation having a combined accuracy of plus or minus 1% of signal over the entire range of measurement.
   2. Electronic airflow control devices: further calibrated and their accuracy verified to plus or minus 5% of signal at a minimum of eight different airflows across the full operating range of the device.
   3. All airflow control devices: individually marked with device specific, factory calibration data to include tag number, serial number, model number, eight-point characterization information (for electronic devices), and quality control inspection numbers.

K. Airflow measuring devices and airflow control devices that are not venturi valves (e.g., Pitot tube, flow cross, air bar, orifice ring, vortex shedder, etc.) are acceptable, provided the following conditions are met:
   1. They meet the performance and construction characteristics stated throughout this section of the specification.
   2. Suppliers of airflow control devices or airflow measuring devices requiring minimum duct diameters: provide revised duct layouts showing the required straight duct runs upstream and downstream of these devices.
   3. Supplier of the airflow control system: submit coordination drawings reflecting these changes and include static pressure loss calculations as part of submittal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Work shall be installed as shown and according to the manufacturer’s diagrams and recommendations.

B. Handle and install units in accordance with manufacturer's written instructions.

C. Support units rigidly so they remain stationary at all times. Cross-bracing or other means of stiffening shall be provided as necessary. Method of support shall be such that distortion and malfunction of units cannot occur.

D. Locate air terminal units to provide a straight section of inlet duct for proper functioning of volume controls. See VA Standard Detail.

3.2 OPERATIONAL TEST

A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

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SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Roof Curbs

B. Air Outlets and Inlets: Diffusers, Registers, and Grilles.

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.

D. Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

E. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

1.3 QUALITY ASSURANCE

A. Refer to Article, QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Fire Safety Code: Comply with NFPA 90A.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data:

1. Air intake/exhaust hoods.

2. Diffusers, registers, grilles and accessories.

C. Coordination Drawings: Refer to article, SUBMITTALS, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Diffusion Council Test Code:

1062 GRD-2015.....Certification, Rating, and Test Manual 4th Edition

C. American Society of Civil Engineers (ASCE):

ASCE7-2017.....Minimum Design Loads for Buildings and Other Structures

D. American Society for Testing and Materials (ASTM):

A-240/A240M-2019.....Standard Specification for Chromium, and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

B209- 2014.....Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

E. National Fire Protection Association (NFPA):

90A-2018.....Standard for the Installation of Air Conditioning and Ventilating Systems

F. Underwriters Laboratories, Inc. (UL):

181-2013.....UL Standard for Safety Factory-Made Air Ducts and Connectors

PART 2 - PRODUCTS

2.1 EQUIPMENT SUPPORTS

A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

2.2 AIR OUTLETS AND INLETS

A. Materials:

1. Steel or aluminum except that all supply air outlets installed in operating rooms and Cystoscopy rooms (see Article 2.3C.3) shall be stainless steel. Use aluminum air outlets and inlets for facilities located in high-humidity areas. Exhaust air registers located in combination toilets and shower stalls shall be constructed from aluminum. Provide manufacturer's standard gasket.
2. Exposed Fastenings: The same material as the respective inlet or outlet. Fasteners for aluminum may be stainless steel.
3. Contractor shall review all ceiling drawings and details and provide all ceiling mounted devices with appropriate dimensions and trim for the specific locations.

B. Performance Test Data: In accordance with Air Diffusion Council Code 1062GRD. Refer to Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT for NC criteria.

C. Air Supply Outlets:

1. Supply Registers: Double deflection type with horizontal face bars and opposed blade damper with removable key operator.
   a. Margin: Flat, 30 mm (1-1/4 inches) wide.
   b. Bar spacing: 20 mm (3/4 inch) maximum.

c. Finish: Off white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting or shall be extruded with manufacturer's standard finish.

2. Supply Grilles: Same as registers but without the opposed blade damper.

D. Return and Exhaust Registers and Grilles: Provide opposed blade damper without removable key operator for registers.

1. Finish: Off-white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting or shall be extruded aluminum with manufacturer's standard aluminum finish.
2. Standard Type: Fixed horizontal face bars set at 30 to 45 degrees, approximately 30 mm (1-1/4 inch) margin.
3. Perforated Face Type: To match supply units.
4. Grid Core Type: 13 mm by 13 mm (1/2 inch by 1/2 inch) core with 30 mm (1-1/4 inch) margin.
5. Linear Type: To match supply units.
6. Door Grilles: Are furnished with the doors.
7. Egg Crate Grilles: Aluminum or Painted Steel 1/2 by 1/2 by 1/2-inch grid providing 90% free area.
   a. Heavy extruded aluminum frame shall have countersunk screw mounting. Unless otherwise indicated, register blades and frame shall have factory applied white finish.
   b. Grille shall be suitable for duct or surface mounting as indicated on drawings. All necessary appurtenances shall be provided to allow for mounting.

E. Acoustic Transfer Grille: Aluminum, suitable for partition or wall mounting.

2.3 WIRE MESH GRILLE

A. Fabricate grille with 2 x 2 mesh 13 mm (1/2 inch) galvanized steel or aluminum hardware cloth in a spot-welded galvanized steel frame with approximately 40 mm (1-1/2 inch) margin.

B. Use grilles where shown in unfinished areas such as mechanical rooms.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with provisions of Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION, particularly regarding coordination with other trades and work in existing buildings.

B. Protection and Cleaning: Protect equipment and materials against physical damage. Place equipment in first class operating condition or return to source of supply for repair or replacement, as determined by Resident Engineer. Protect equipment during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting.

3.2 TESTING, ADJUSTING AND BALANCING (TAB)

Refer to Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

3.3 OPERATING AND PERFORMANCE TESTS

Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

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SECTION 23 40 00
HVAC AIR CLEANING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Air filters for heating, ventilating and air conditioning.

B. Definitions: Refer to ASHRAE Standard 52.2 for definitions of face velocity, net effective filtering area, media velocity, initial resistance (pressure drop), MERV (Minimum Efficiency Reporting Value), PSE (Particle Size Efficiency), particle size ranges for each MERV number, dust holding capacity and explanation of electrostatic media used filtration products versus mechanical filtration products. Refer to ASHRAE Standard 52.2 Appendix J for definition of MERV-A.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.

D. Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS: Requirements for commissioning, systems readiness checklists, and training.

E. Section 23 37 00 AIR OUTLETS AND INLETS.

F. Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS: Filter housing and racks.

1.3 QUALITY ASSURANCE

A. Air Filter Performance Report for Extended Surface Filters:

1. Submit a test report for each Grade of filter being offered. The report shall not be more than three (3) years old and prepared by using test equipment, method and duct section as specified by ASHRAE Standard 52.2 for type filter under test and acceptable to Resident Engineer, indicating that filters comply with the requirements of this specification. Filters utilizing partial or complete synthetic media will be tested in compliance with pre-conditioning steps as stated in Appendix J. All testing is to be conducted on filters with a nominal 24 inch by 24 inch face dimension. Test for 150 m/min (500 fpm) will be accepted for lower velocity rated filters provided the test report of an independent testing laboratory complies with all the requirements of this specification.

2. Government Option: The Government at its option may take one of the filters for each different type submitted and run an independent test to determine if the filter meets the requirements of this specification. When the filter meets the requirements, the Government will pay for the test. When the filter does not meet the specification requirements, the manufacturer will be required to pay for the test and replace the filters with filters that will perform as required by the specifications.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Extended surface filters.
2. Holding frames. Identify locations.
3. Side access housings. Identify locations, verify insulated doors.
4. Magnehelic gages.

C. Air Filter performance reports.

D. Suppliers warranty.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE):

52.2-2017.....Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size, including Appendix J

C. American Society of Mechanical Engineers (ASME):

NQA-1-2017.....Quality Assurance Requirements for Nuclear Facilities Applications

D. Underwriters Laboratories, Inc. (UL):

900; Revision 15 July 2015 Test Performance of Air Filter Units

PART 2 - PRODUCTS

2.1 REPLACEMENT FILTER ELEMENTS TO BE FURNISHED

A. To allow temporary use of HVAC systems for testing and in accordance with Paragraph, TEMPORARY USE OF MECHANICAL AND ELECTRICAL SYSTEMS in

Section 01 00 00, GENERAL REQUIREMENTS, provide one complete set of additional filters to the Resident Engineer.

B. The Resident Engineer will direct whether these additional filters will either be installed as replacements for dirty units or turned over to VA for future use as replacements.

2.2 EXTENDED SURFACE AIR FILTERS

A. Use factory assembled air filters of the extended surface type with supported or non-supported cartridges for removal of particulate matter in air conditioning, heating and ventilating systems. Filter units shall be of the extended surface type fabricated for disposal when the contaminant load limit is reached as indicated by maximum (final) pressure drop.

B. Filter Classification: UL listed and approved conforming to UL Standard 900.

C. HVAC Filter Types

HVAC Filter Types
Table 2.2C

MERV Value ASHRAE 52.2	MERV-A Value ASHRAE 62.2 Appendix J	Application	Particle Size	Thickness /Type
8	8-A	Pre-Filter	3 to 10 Microns	50 mm (2-inch) Throwaway
11	11-A	After-Filter	1 to 3 Microns	150 mm (6-inch) or 300 mm (12-inch) Rigid Cartridge
13	13-A	After-Filter	0.3 to 1 Microns	150 mm (6-inch) or 300 mm (12-inch) Rigid Cartridge
14	14-A	After-Filter	0.3 to 1 Microns	150 mm (6-inch) or 300 mm (12-inch) Rigid Cartridge

2.3 MEDIUM EFFICIENCY PLEATED PANEL PRE-FILTERS (2″; MERV 8; UL 900 CLASS 2):

A. Construction: Air filters shall be medium efficiency ASHRAE pleated panels consisting of cotton and synthetic or 100% virgin synthetic media, self-supporting media with required media stabilizers, and

beverage board enclosing frame. Filter media shall be lofted to a uniform depth and formed into a uniform radial pleat. The media stabilizers shall be bonded to the downstream side of the media to maintain radial pleats and prevent media oscillation. An enclosing frame of no less than 28-point high wet-strength beverage board shall provide a rigid and durable enclosure. The frame shall be bonded to the media on all sides to prevent air bypass. Integral diagonal support members on the air entering and air exiting side shall be bonded to the apex of each pleat to maintain uniform pleat spacing in varying airflows.

B. Performance: The filter shall have a Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2. It shall also have a MERV-A of 8 when tested per Appendix J of the same standard. The media shall maintain or increase in efficiency over the life of the filter. Pertinent tolerances specified in Section 7.4 of the Air-Conditioning and Refrigeration Institute (ARI) Standard 850-2014 shall apply to the performance ratings. All testing is to be conducted on filters with a nominal 24” x 24” face dimension.

Minimum Efficiency Reporting (MERV)	8
Dust Holding Capacity (Grams)	105
Nominal Size (Width x Height x Depth)	24x24x2
Rated Air Flow Capacity (Cubic Feet per Minute)	2,000
Rated Air Flow Rate (Feet per Minute)	500
Final Resistance (Inches w.g.) Maximum Recommended Change-Out Resistance (Inches w.g.)	1.0 0.66
Rated Initial Resistance (Inches w.g.)	0.33

C. The filters shall be approved and listed by Underwriters' Laboratories, Inc. as Class 2 when tested according to U. L. Standard 900 and CAN 4-5111.

2.4 HIGH EFFICIENCY EXTENDED SURFACE (INTERMEDIATE/AFTER (FINAL)) CARTRIDGE FILTERS (12”; MERV 14/13/11; UL 900 CLASS 2):

A. Construction: Air filters shall consist of 8 pleated media packs assembled into 4 V-banks within a totally plastic frame. The filters shall be capable of operating at temperatures up to 80 degrees C (176

degrees F). The filters must either fit without modification or be adaptable to the existing holding frames. The molded end panels are to be made of high impact polystyrene plastic. The center support members shall be made of ABS plastic. No metal components are to be used.

B. Media: The media shall be made of micro glass fibers with a water repellent binder. The media shall be a dual density construction, with coarser fibers on the air entering side and finer fibers on the air leaving side. The media shall be pleated using separators made of continuous beads of low-profile thermoplastic material. The media packs shall be bonded to the structural support members at all points of contact, this improves the rigidity as well as eliminates potential air bypass in the filter

C. Performance: Filters of the size, air flow capacity and nominal efficiency (MERV) shall meet the following rated performance specifications based on the ASHRAE 52.2-1999 test method. Where applicable, performance tolerance specified in Section 7.4 of the Air-Conditioning and Refrigeration Institute (ARI) Standard 850-2014 shall apply to the performance ratings. All testing is to be conducted on filters with a nominal 24"x24" header dimension.

Minimum Efficiency Reporting Value (MERV)	14	13	11
Gross Media Area (Sq. Ft.) Dust Holding Capacity (Grams)	197 486	197 430	197 465
Nominal Size (Width x Height x Depth)	24x24x12	24x24x12	24x24x12
Rated Air Flow Capacity (cubic feet per minute)	2,000	2,000	2,000
Rated Air Flow Rate (feet per minute)	500	500	500
Final Resistance (inches w.g.) Maximum Recommended Change-Out Resistance (Inches w.g.)	2.0 0.74	2.0 0.68	2.0 0.54
Rated Initial Resistance (inches w.g.)	0.37	0.34	0.27

2.7 FILTER HOUSINGS/SUPPORT FRAMES

A. Side Servicing Housings (HVAC Grade)

1. Filter housing shall be two-stage filter system consisting of 16-gauge galvanized steel enclosure, aluminum filter mounting track,

universal filter holding frame, insulated dual-access doors, static pressure tap, filter gaskets and seals. In-line housing depth shall not exceed 21”. Sizes shall be as noted on enclosed drawings or other supporting materials.

2. Construction: The housing shall be constructed of 16-gauge galvanized steel with pre-drilled standing flanges to facilitate attachment to other system components. Corner posts of Z-channel construction shall ensure dimensional adherence. The housing shall incorporate the capability of two stages of filtration without modification to the housing. A filter track, of aluminum construction shall be an integral component of housing construction. The track shall accommodate a 2” deep prefilter, a 6” or 12” deep rigid final filter, or a pocket filter with header. Insulated dual access doors, swing-open type, shall include high-memory sponge neoprene gasket to facilitate a door-to-filter seal. Each door shall be equipped with adjustable and replaceable positive sealing UV-resistant star-style knobs and replaceable door hinges. A universal holding frame constructed of 18-gauge galvanized steel, equipped with centering dimples, multiple fastener lances, and polyurethane filter sealing gasket, shall be included to facilitate installation of high-efficiency filters. The housing shall include a pneumatic fitting to allow the installation of a static pressure gauge to evaluate pressure drop across a single filter or any combination of installed filters.
3. Performance: Leakage at rated airflow, upstream to downstream of filter, holding frame, and slide mechanism shall be less than 1% at 3.0” w.g. Leakage in to or out of the housing shall be less than one half of 1% at 3.0” w.g. Accuracy of pneumatic pressure fitting, when to evaluate a single-stage, or multiple filter stages, shall be accurate within ± 3% at 0.6” w.g.
4. Manufacturer shall provide evidence of facility certification to ISO 9001:2015.

B. Holding Frame System (HVAC Grade):

1. Air filter-holding frames shall be 16-gauge galvanized steel with filter sealing flange, centering dimples, sealing gasket and lances for appropriate air filter fasteners. Sizes shall be noted on drawings or other supporting materials.

2. Construction: Filter holding frame shall be constructed of 16-gauge galvanized steel. The frame shall be assembled from two corner sections and welded to assure a rigid and durable frame assembly. The frame shall include a variety of pre-punched lances for filter fastener attachment. Fastener shall be capable of being installed without the use of tools, nuts or bolts. Lance penetrations shall be upstream of filter flange to assure leak-free integrity. The frame shall include filter-centering dimples on each frame wall to facilitate ease of filter installation and assure filter centering against filter sealing flange. A 3/4” filter-sealing flange shall be an integral component of the holding frame. All corners shall be flush mitered and a permanently mounted polyurethane foam gasket shall be mounted on the sealing flange to assure filter to frame sealing integrity.
3. Manufacturer shall provide evidence of facility certification to ISO 9001:2015.

C. Equipment Identification: Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATON.

2.11 INSTRUMENTATION

A. Magnehelic Differential Pressure Filter Gages: Nominal 100 mm (four inch) diameter, zero to 500 Pa (zero to two inch water gage). Gauges shall be flush-mounted in aluminum panel board, complete with static tips, copper or aluminum tubing, and accessory items to provide zero adjustment.

B. DDC static (differential) air pressure measuring station. Refer to Specification Section 23 09 23 DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

C. Provide one DDC sensor across each extended surface filter. Provide Petcocks for each gauge or sensor.

D. Provide one common filter gauge for two-stage filter banks with isolation valves to allow differential pressure measurement.

2.12 HVAC EQUIPMENT FACTORY FILTERS

A. Manufacturer standard filters within fabricated packaged equipment should be specified with the equipment and should adhere to industry standard.

B. Cleanable filters are not permitted.

C. Automatic Roll Type filters are not permitted.

2.13 FILTER RETURN GRILLES

A. Refer to Section 23 37 00 AIR OUTLETS AND INLETS.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install supports, filters and gages in accordance with manufacturer's instructions.

B. Label clearly with words "Contaminated Air" on exhaust ducts leading to the HEPA filter housing.

3.2 START-UP AND TEMPORARY USE

A. Clean and vacuum air handling units and plenums prior to starting air handling systems.

B. Replace Pre-filters and install clean filter units prior to final inspection as directed by the Resident Engineer.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

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SECTION 23 73 00
INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Air handling units including integral components specified herein.

B. Definitions: Air Handling Unit (AHU): A factory fabricated and tested assembly of modular sections consisting of housed-centrifugal fan with V-belt drive, single or multiple plenum fans with direct-drive, coils, filters, and other necessary equipment to perform one or more of the following functions of circulating, cleaning, heating, cooling, humidifying, dehumidifying, and mixing of air. Design capacities of units shall be as scheduled on the drawings.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES,

C. Section 09 91 00, PAINTING.

D. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

E. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

F. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT.

G. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

H. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.

I. Section 23 07 11, HVAC, AND BOILER PLANT INSULATION.

J. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.

K. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

L. Section 23 31 00, HVAC DUCTS and CASINGS.

M. Section 23 34 00, HVAC FANS.

N. Section 23 40 00, HVAC AIR CLEANING DEVICES.

O. Section 23 82 16, AIR COILS.

P. Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS.

1.3 QUALITY ASSURANCE

A. Refer to Article, Quality Assurance, in Section 23 05 11, COMMON WORK RESULTS FOR.

B. Air Handling Units Certification

1. Air Handling Units with Housed Centrifugal Fans: The air handling units shall be certified in accordance with AHRI 430 and tested/rated in accordance with AHRI 260.
2. Air Handling Units with Plenum Fans:
   a. Air Handling Units with a single Plenum Fan shall be certified in accordance with AHRI 430 and tested/rated in accordance with AHRI 260.
   b. Air handling Units with Multiple Fans in an Array shall be tested and rated in accordance with AHRI 430 and AHRI 260.

C. Heating, Cooling, and Air Handling Capacity and Performance Standards: AHRI 430, AHRI 410, ASHRAE 51, and AMCA 210.

D. Performance Criteria:
1. The fan BHP shall include all system effects for all fans and v-belt drive losses for housed centrifugal fans.
2. The fan motor shall be selected within the rated nameplate capacity, without relying upon NEMA Standard Service Factor.
3. Select the fan operating point as follows:
   a. Forward Curve and Axial Flow Fans: Right hand side of peak pressure point.
   b. Air Foil, Backward Inclined, or Tubular Fans Including Plenum Fans: At or near the peak static efficiency but at an appropriate distance from the stall line.
4. Operating Limits: AMCA 99 and Manufacturer’s Recommendations.

E. Units shall be factory-fabricated, assembled, and tested by a manufacturer, in business of manufacturing similar air-handling units for at least five (5) years.

1.4. SUBMITTALS:

A. The contractor shall, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish a complete submission for all air handling units covered in the project. The submission shall include all information listed below. Partial and incomplete submissions shall be rejected without reviews.

B. Manufacturer's Literature and Data:
1. Submittals for AHUs shall include fans, drives, motors, coils, sound attenuators, mixing box with outside/return air dampers, filter housings, blender sections, and all other related accessories. The contractor shall provide custom drawings showing total air handling

unit assembly including dimensions, operating weight, access sections, flexible connections, door swings, controls penetrations, electrical disconnect, lights, duplex receptacles, switches, wiring, utility connection points, unit support system, vibration isolators, drain pan, pressure drops through each component (filter, coil etc).

2. Submittal drawings of section or component only will not be acceptable. Contractor shall also submit performance data including performance test results, charts, curves or certified computer selection data; data sheets; fabrication and insulation details. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements. This data shall be submitted in hard copies and in electronic version compatible to AutoCAD version used by the VA at the time of submission.
3. Submit sound power levels in each octave band for the inlet and discharge of the fan and at entrance and discharge of AHUs at scheduled conditions. In absence of sound power ratings refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
4. Provide fan curves showing Cubic Feet per Minute, static pressure, efficiency, and horsepower for design point of operation and at maximum design Cubic Feet per Minute.
5. Submit total fan static pressure, external static pressure, for AHU including total, inlet and discharge pressures, and itemized specified internal losses and unspecified internal losses. Refer to air handling unit schedule on drawings.

C. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS. Include instructions for lubrication, filter replacement, motor and drive replacement, spare part lists, and wiring diagrams.

D. Submit written test procedures two weeks prior to factory testing. Submit written results of factory tests for approval prior to shipping.

E. Submit shipping information that clearly indicates how the units will be shipped in compliance with the descriptions below.

1. Units shall be shipped in one (1) piece where possible and in shrink wrapping to protect the unit from dirt, moisture and/or road salt.

2. If not shipped in one (1) piece, provide manufacturer approved shipping splits where required for installation or to meet shipping and/or job site rigging requirements in modular sections. Indicate clearly that the shipping splits shown in the submittals have been verified to accommodate the construction constraints for rigging as required to complete installation and removal of any section for replacement through available access without adversely affecting other sections.
3. If shipping splits are provided, each component shall be individually shrink wrapped to protect the unit and all necessary hardware (e.g. bolts, gaskets etc.) will be included to assemble unit on site (see section 2.1.A4).
4. Lifting lugs will be provided to facilitate rigging on shipping splits and joining of segments. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air-Conditioning, Heating, and Refrigeration Institute (AHRI)/(ARI):

410-2001.....Standard for Forced-Circulation Air-Heating and Air-Cooling Coils

430-2014.....Central Station Air Handling Units

C. Air Movement and Control Association International, Inc. (AMCA):

210-2016.....Laboratory Methods of Testing Fans for Rating

D. American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE):

170-2017.....Ventilation of Health Care Facilities

E. American Society for Testing and Materials (ASTM):

B117-2019.....Standard Practice for Operating Salt Spray (Fog) Apparatus

D1654-2016.....Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

D1735-2014.....Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

D3359-2017.....Standard Test Methods for Measuring Adhesion by Tape Test

F. Military Specifications (Mil. Spec.):

P-21035B-2003.....Paint, High Zinc Dust Content, Galvanizing Repair (Metric)

G. National Fire Protection Association (NFPA):

90A-2018.....Standard for Installation of Air Conditioning and Ventilating Systems, 2009

H. Energy Policy Act of 2005 (P.L.109-58)

PART 2 - PRODUCTS

2.1 AIR HANDLING UNITS

A. General:

1. AHUs shall be fabricated from insulated, solid double-wall galvanized steel without any perforations in draw-through configuration. Casing shall be fabricated as specified in section 2.1.C.2. Galvanizing shall be hot dipped conforming to ASTM A525 and shall provide a minimum of 0.275 kg of zinc per square meter (0.90 oz. of zinc per square foot) (G90). Aluminum constructed units, subject to VA approval, may be used in place of galvanized steel. The unit manufacturer shall provide published documentation confirming that the structural rigidity of aluminum air-handling units is equal or greater than the specified galvanized steel.
2. The contractor and the AHU manufacturer shall be responsible for ensuring that the unit will not exceed the allocated space shown on the drawings, including required clearances for service and future overhaul or removal of unit components. All structural, piping, wiring, and ductwork alterations of units, which are dimensionally different than those specified, shall be the responsibility of the contractor at no additional cost to the government.
3. AHUs shall be fully assembled by the manufacturer in the factory in accordance with the arrangement shown on the drawings. The unit shall be assembled into the largest sections possible subject to shipping and rigging restrictions. The correct fit of all components and casing sections shall be verified in the factory for all units

prior to shipment. All units shall be fully assembled, tested, and then split to accommodate shipment and job site rigging. On units not shipped fully assembled, the manufacturer shall tag each section and include air flow direction to facilitate assembly at the job site. Lifting lugs or shipping skids shall be provided for each section to allow for field rigging and final placement of unit.

4. The AHU manufacturer shall provide the necessary gasketing, caulking, and all screws, nuts, and bolts required for assembly. The manufacturer shall provide a factory-trained and qualified local representative at the job site to supervise the assembly and to assure that the units are assembled to meet manufacturer's recommendations and requirements noted on the drawings. Provide documentation to the Contracting Officer that the local representative has provided services of similar magnitude and complexity on jobs of comparable size. If a local representative cannot be provided, the manufacturer shall provide a factory representative.
5. Gaskets: All door and casing and panel gaskets and gaskets between air handling unit components, if joined in the field, shall be high quality which seal air tight and retain their structural integrity and sealing capability after repeated assembly and disassembly of bolted panels and opening and closing of hinged components. Bolted sections may use a more permanent gasketing method provided they are not disassembled.
6. Structural Rigidity: Provide structural reinforcement when required by span or loading so that the deflection of the assembled structure shall not exceed 1/200 of the span based on a differential static pressure of 1991 PA (8-inch WG) or higher.

B. Base:

1. Provide a heavy-duty steel base for supporting all major AHU components. Bases shall be constructed of wide-flange steel I-beams, channels, or minimum 125 mm (5 inch) high 3.5 mm (10 Gauge) steel base rails. Welded or bolted cross members shall be provided as required for lateral stability. Contractor shall provide supplemental steel supports as required to obtain proper operation heights for cooling coil condensate drain trap as shown on drawings.

2. AHUs shall be completely self supporting for installation on concrete housekeeping pad, steel support pedestals, or suspended as shown on drawings.
3. The AHU bases not constructed of galvanized steel shall be cleaned, primed with a rust inhibiting primer, and finished with rust inhibiting exterior enamel.

C. Casing (including wall, floor and roof):

1. General: AHU casing shall be constructed as solid double wall, galvanized steel insulated panels without any perforations, integral of or attached to a structural frame. The thickness of insulation, mode of application and thermal breaks shall be such that there is no visible condensation on the exterior panels of the AHU located in the non-conditioned spaces.
2. Casing Construction:

Table 2.1.C.2

Outer Panel	0.8 mm (22 Gage) Minimum
Inner Panel	0.8 mm (22 Gage) Minimum
Insulation Thickness Density	Foam 50 mm (2 inch) Minimum 48 kg/m^3 (3.0 lb/ft^3) Minimum
Total R Value	2.3 m^2.K/W (13.0 ft^2.^{O}F.hr/Btu) Minimum

3. Casing Construction (Contractor's Option):

Table 2.1.C.3

Outer Panel	1.3 mm (18 Gage) Minimum
Inner Panel	1.0 mm (20 Gage) Minimum
Insulation Thickness Density	Fiberglass 50 mm (2 inch) Minimum 24 kg/m^3 (1.5 lb/ft^3) Minimum
Total R Value	1.4 m^2.K/W (8.0 ft^2.^{O}F.hr/Btu) Minimum

4. Blank-Off: Provide blank-offs as required to prevent air bypass between the AHU sections, around coils, and filters.
5. Casing panels shall be secured to the support structure with stainless steel or zinc-chromate plated screws and gaskets installed

around the panel perimeter. Panels shall be completely removable to allow removal of fan, coils, and other internal components for future maintenance, repair, or modifications. Welded exterior panels are not acceptable.

6. Access Doors: Provide in each access section and where shown on drawings. Show single-sided and double-sided access doors with door swings on the floor plans. Doors shall be a minimum of 50 mm (2 inch) thick with same double wall construction as the unit casing. Doors shall be a minimum of 600 mm (24 inches) wide, unless shown of different size on drawings, and shall be the full casing height up to a maximum of 1850 mm (6 feet). Doors shall be gasketed, hinged, and latched to provide an airtight seal. The access doors for fan section, mixing box, and coil section shall include a minimum 150 mm x 150 mm (6-inch x 6 inch) double thickness, with air space between the glass panes tightly sealed, reinforced glass or Plexiglas window in a gasketed frame.
   a. Hinges: Manufacturers standard, designed for door size, weight and pressure classifications. Hinges shall hold door completely rigid with minimum 45 kg (100 lb) weight hung on latch side of door.
   b. Latches: Non-corrosive alloy construction, with operating levers for positive cam action, operable from either inside or outside. Doors that do not open against unit operating pressure shall allow the door to ajar and then require approximately 0.785 radian (45 degrees) further movement of the handle for complete opening. Latch shall be capable of restraining explosive opening of door with a force not less than 1991 Pa (8-inch WG).
   c. Gaskets: Neoprene, continuous around door, positioned for direct compression with no sliding action between the door and gasket. Secure with high quality mastic to eliminate possibility of gasket slipping or coming loose.
7. Provide sealed sleeves, metal or plastic escutcheons or grommets for penetrations through casing for power and temperature control wiring and pneumatic tubing. Coordinate with electrical and temperature control subcontractors for number and location of penetrations. Coordinate lights, switches, and duplex receptacles and disconnect switch location and mounting. All penetrations and equipment

mounting may be provided in the factory or in the field. All field penetrations shall be performed neatly by drilling or saw cutting. No cutting by torches will be allowed. Neatly seal all openings airtight.

D. Painted Exterior Finish: Galvanized steel (G90) exterior shall be mill prepared for painting by bonderizing and factory prepared for prime coat of paint by acid etch cleaning, as required, to assure paint adhesion. Provide factory applied prime coat and enamel finish coat of paint of color selected by owner. Paint corrosion resistance and adhesion shall have satisfactorily passed ASTM B117, D1654, D1735, D3359 and G23 for a minimum of 500 hours. Rating of failure at the scribe mark shall not be less than 6, average creepage not greater than 3 mm (1/8 inch). Rating of the inscribed area shall not be less than 10, no failure. Refer to Section 09 91 00, PAINTING.

E. Floor:

1. Unit floor shall be level without offset space or gap and designed to support a minimum of 488 kg/square meter (100 lbs per square foot) distributed load without permanent deformation or crushing of internal insulation. Provide adequate structural base members beneath floor in service access sections to support typical service foot traffic and to prevent damage to unit floor or internal insulation. Unit floors in casing sections, which may contain water or condensate, shall be watertight with drain pan.
2. Where indicated, furnish and install floor drains, flush with the floor, with nonferrous grate cover and stub through floor for external connection.

F. Condensate Drain Pan: Drain pan shall be designed to extend entire length of cooling coils including headers and return bends. Depth of drain pan shall be at least 43 mm (1.7 inches) and shall handle all condensate without overflowing. Drain pan shall be double-wall, double sloping type, and fabricated from stainless (304) with at least 50 mm (2 inch) thick insulation sandwiched between the inner and outer surfaces. Drain pan shall be continuous metal or welded watertight. No mastic sealing of joints exposed to water will be permitted. Drain pan shall be placed on top of casing floor or integrated into casing floor assembly. Drain pan shall be pitched in all directions to drain line.

1. An intermediate, stainless-steel (304) condensate drip pan with copper downspouts shall be provided on stacked cooling coils. Use of intermediate condensate drain channel on upper casing of lower coil is permissible provided it is readily cleanable. Design of intermediate condensate drain shall prevent upper coil condensate from flowing across face of lower coil.
2. Drain pan shall be piped to the exterior of the unit. Drain pan shall be readily cleanable.
3. Installation, including frame, shall be designed and sealed to prevent blow-by.

G. Housed Centrifugal Fan Sections:

1. Fans shall be minimum Class II construction, double width, double inlet centrifugal, air foil or backward inclined or forward curved type as indicated on drawings, factory balanced and rated in accordance with AMCA 210 or ASHRAE 51. Provide self-aligning, pillow block, re-greasable ball-type bearings selected for a B (10) life of not less than 50,000 hours and an L (50) average fatigue life of 200,000 hours per AFBMA Standard 9. Extend bearing grease lines to motor and drive side of fan section. Fan shall be located in airstream to assure proper air flow.
2. Provide internally vibration isolated fan, motor and drive, mounted on a common integral bolted or welded structural steel base with adjustable motor slide rail with locking device. Provide vibration isolators and flexible duct connections at fan discharge to completely isolate fan assembly. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT, for additional requirements.
3. Allowable vibration tolerances for fan shall not exceed a self-excited vibration maximum velocity of 0.005 m/s (0.20 inch per second) RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal and axial directions or measured at equipment mounting feet if bearings are concealed. After field installation, compliance to this requirement shall be demonstrated with field test in accordance with Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT and Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC. Following fan assembly, the complete fan assembly balance shall be

tested using an electronic balance analyzer with a tunable filter and stroboscope. Vibration measurements shall be taken on each motor bearing housing in the vertical, horizontal, and axial planes (5 total measurements, 2 each motor bearing and 1 axial).

H. Fan Motor, Drive, and Mounting Assembly (Housed Centrifugal Fans):
   1. Fan Motor and Drive: Motors shall be premium energy efficient type, as mandated by the Energy Policy Act of 2005, with efficiencies as shown in the Specifications Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION, on drawings and suitable for use in variable frequency drive applications on AHUs where this type of drive is indicated. Refer to Section 23 05 11, COMMON WORK RESULTS, for additional motor and drive specifications. Refer to Specification Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS.
   2. Fan drive and belts shall be factory mounted with final alignment and belt adjustment to be made by the Contractor after installation. Drive and belts shall be as specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC. Provide additional drive(s) if required during balancing, to achieve desired airflow.

I. Mixing Boxes: Mixing box shall consist of casing and outdoor air and return air dampers in opposed blade arrangement with damper linkage for automatic operation. Coordinate damper operator with Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. Dampers shall be of ultra-low leak design with metal compressible bronze jamb seals and extruded vinyl edge seals on all blades. Blades shall rotate on stainless steel sleeve bearings or bronze bushings. Leakage rate shall not exceed 1.6 cubic meters/min/square meter (5 CFM per square foot) at 250 Pa (1 inch WG) and 2.8 cubic meters/min/square meter (9 CFM per square foot) at 995 Pa (4 inch WG) Electronic operators shall be furnished and mounted in an accessible and easily serviceable location by the air handling unit manufacturer at the factory. Damper operators shall be of same manufacturer as controls furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

J. Filter Section: Refer to Section 23 40 00, HVAC AIR CLEANING DEVICES, for filter requirements.
   1. Filters including one complete set for temporary use at site shall be provided independent of the AHU. The AHU manufacturer shall install filter housings and racks in filter section compatible with

filters furnished. The AHU manufacturer shall be responsible for furnishing temporary filters (pre-filters and after-filters, as shown on drawings) required for AHU testing.

2. Factory-fabricated filter section shall be of the same construction and finish as the AHU casing including filter racks and hinged double wall access doors. Filter housings shall be constructed in accordance with side service or holding frame housing requirements in Section 23 40 00, HVAC AIR CLEANING DEVICES.

K. Coils: Coils shall be mounted on hot dipped galvanized steel supports to assure proper anchoring of coil and future maintenance. Coils shall be face or side removable for future replacement thru the access doors or removable panels. Each coil shall be removable without disturbing adjacent coil. Cooling coils shall be designed and installed to insure no condensate carry over. Provide factory installed extended supply, return, drain, and vent piping connections. All coils in the high humidity areas, shall be epoxy-coated as shown below. Refer to Drawings and Section 23 82 16, AIR COILS for additional coil requirements.

1. Epoxy Immersion Coating – Electrically Deposited: The multi-stage corrosion-resistant coating application comprises of cleaning (heated alkaline immersion bath) and reverse-osmosis immersion rinse prior to the start of the coating process. The coating thickness shall be maintained between 0.6-mil and 1.2-mil. Before the coils are subjected to high-temperature oven cure, they are treated to permeate immersion rinse and spray. Where the coils are subject to UV exposure, UV protection spray treatment comprising of UV-resistant urethane mastic topcoat shall be applied. Provide complete coating process traceability for each coil and minimum five years of limited warranty.
2. The coating process shall such that uniform coating thickness is maintained at the fin edges. The quality control shall be maintained by ensuring compliance to the applicable ASTM Standards for the following:
   a. Salt Spray Resistance (Minimum 6,000 Hours)
   b. Humidity Resistance (Minimum 1,000 Hours)
   c. Water Immersion (Minimum 260 Hours)
   d. Cross-Hatch Adhesion (Minimum 4B-5B Rating)
   e. Impact Resistance (Up to 160 Inch/Pound)

L. Sound Attenuators: Refer to Drawings, Specification Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT, and Section 23 31 00, HVAC DUCTS AND CASINGS, for additional unit mounted sound attenuator requirements. AHU sound attenuators shall be factory installed as an integral part of AHU.

M. Discharge Section:
Provide aerodynamically designed framed discharge openings or spun bellmouth fittings to minimize pressure loss.

N. Electrical and Lighting: Wiring and equipment specifications shall conform to Division 26, ELECTRICAL.

1. Vapor-proof lights using cast aluminum base style with glass globe and cast aluminum guard shall be installed in access sections for fan, mixing box, and any section over 300 mm (12 inch) wide. A switch shall control the lights in each compartment with pilot light mounted outside the respective compartment access door. Wiring between switches and lights shall be factory installed. All wiring shall run in neatly installed electrical conduits and terminate in a junction box for field connection to the building system. Provide single point 115 volt - one phase connection at junction box.
2. Install compatible 100-watt bulb in each light fixture.
3. Provide a convenience duplex receptacle next to the light switch.
4. Disconnect switch and power wiring: Provide factory or field mounted disconnect switch. Coordinate with Division 26, ELECTRICAL.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install air handling unit in conformance with ARI 435.

B. Assemble air handling unit components following manufacturer's instructions for handling, testing and operation. Repair damaged galvanized areas with paint in accordance with Military Spec. DOD-P-21035. Repair painted units by touch up of all scratches with finish paint material. Vacuum the interior of air handling units clean prior to operation.

C. Leakage and test requirements for air handling units shall be the same as specified for ductwork in Specification Section 23 31 00, HVAC DUCTS AND CASINGS except leakage shall not exceed Leakage Class (C_L) 12 listed in SMACNA HVAC Air Duct Leakage Test Manual when tested at 1.5 times

the design static pressure. Repair casing air leaks that can be heard or felt during normal operation and to meet test requirements.

D. Perform field mechanical (vibration) balancing in accordance with Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

E. Seal and/or fill all openings between the casing and AHU components and utility connections to prevent air leakage or bypass.

3.2 STARTUP SERVICES

A. The air handling unit shall not be operated for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings are lubricated, and fan has been test run under observation.

B. After the air handling unit is installed and tested, provide startup and operating instructions to VA personnel.

C. An authorized factory representative should start up, test and certify the final installation and application specific calibration of control components. Items to be verified include fan performance over entire operating range, noise and vibration testing, verification of proper alignment, overall inspection of the installation, Owner/Operator training, etc.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

- - - E N D - - -

SECTION 23 81 00
DECENTRALIZED UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies split-systems and air conditioners.

B. Definitions:

1. Energy Efficiency Ratio (EER): The ratio of net cooling capacity is Btu/h to total rate of electricity input in watts under designated operating conditions (Btu hour/Watt).
2. Seasonal Energy Efficiency Ratio (SEER): The ratio of the total cooling output of an air conditioner during its normal annual usage period for cooling in Btu/h divided by total electric energy input in watts during the same period (Btu hour/Watt).
3. Unitary: A Unitary Air Conditioner consists of one or more factory-made assemblies which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function as well.
4. Where such equipment is provided in more than one assembly the separated assemblies are to be designed to be used together and the requirements of rating are based upon use of matched assemblies.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES

C. Section 07 72 00, ROOF ACCESSORIES.

D. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

E. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION EQUIPMENT

F. Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

G. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

H. Section 23 07 11, HVAC and BOILER PLANT INSULATION.

I. Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS.

J. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

K. Section 23 23 00, REFRIGERANT PIPING.

L. Section 23 31 00, HVAC DUCTS and CASINGS.

M. Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

N. Section 23 82 16, AIR COILS

1.3 QUALITY ASSURANCE

A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Safety Standards: ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES

B. Manufacturer's literature and data:

1. Sufficient information, including capacities, pressure drops, and piping connections clearly presented, shall be included to determine compliance with drawings and specifications for units noted below:
   a. Unitary air conditioners:
      1. Self-contained units
      2. Split systems
      3. Rooftop units
2. Unit Dimensions required clearances, operating weights accessories and start-up instructions.
3. Electrical requirements, wiring diagrams, interlocking and control wiring showing factory installed and portions to be field installed.
4. Mounting and flashing of the roof curb to the roofing structure with coordinating requirements for the roof membrane system.

C. Certification: Submit proof of specified ARI Certification.

D. Performance Rating: Submit catalog selection data showing equipment ratings and compliance with required sensible-to-heat-ratio, energy efficiency ratio (EER), and coefficient of performance (COP).

E. Operating and Maintenance Manual: Submit three copies of Operating and Maintenance manual to Resident Engineer three weeks prior to final inspection.

F. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air-Conditioning, Heating, and Refrigeration Institute (AHRI):

210/240-2017.....Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment

270-2015.....Sound Rating of Outdoor Unitary Equipment

310/380-2017.....Standard for Packaged Terminal Air-Conditioners and Heat Pumps (CSA-C744-04)

340/360-2015.....Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment

520-2004.....Performance Rating of Positive Displacement Condensing Units

C. Air Movement and Control Association (AMCA):

210-2016.....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)

410-1996.....Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans

D. American National Standards Institute (ANSI):

S12.51-2017.....Acoustics - Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Method for Reverberation Rooms (same as ISO 3741:1999)

E. American Society of Civil Engineers (ASCE)

ASCE 7-2017.....Minimum Design Loads for Buildings and Other Structures

F. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

Handbook 2016.....HVAC Systems and Equipment

15-2019.....Safety Standard for Refrigeration Systems (ANSI)

62.1-2016.....Ventilation for Acceptable Indoor Air Quality (ANSI)

G. Federal Specifications (Fed. Spec.):

A-A-50502-2009..... Air conditioner (Unitary Heat Pump) Air to Air (3000-300,000 Btu)

H. Military Specifications (Mil. Specs.):

MIL-PRF-26915D-1997.....Primer Coating, for Steel Surfaces

I. National Electrical Manufacturer's Association (NEMA):

ICS 1-2005.....Industrial Controls and Systems: General Requirements

MG 1-2019.....Motors and Generators (ANSI)

J. National Fire Protection Association (NFPA) Publications:

90A-2018.....Standard for the Installation of Air-Conditioning and Ventilating Systems

PART 2 - PRODUCTS

2.1 UNITARY AIR CONDITIONERS - GENERAL

A. Applicable ARI Standards:

2. Cooling Capacity Less Than 39.6 kW (135,000 Btu/h): AHRI 210/240. Units shall be listed in the ARI Directory of Certified Unitary Air-Conditioners.

B. Performance Rating: Cooling capacity of units shall meet the sensible heat and total heat requirements shown in the contract documents. In selecting unit size, make true allowance for "sensible to total heat ratio" to satisfy required sensible cooling capacity.

C. Machinery Guards: Provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated casings.

D. Corrosion Prevention: Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc coating or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall be tested for 500 hours. The salt-spray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust beyond 3 mm (1/8-inch) on both sides from the scratch mark.

2.2 SPLIT-SYSTEM AIR CONDITIONERS

A. Description: Factory assembled and tested, floor-mounted unit, with an air-cooled, remote condensing unit, and field-installed refrigeration piping.

B. Concealed Evaporator Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Factory-applied duct liner.
3. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
5. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with AHRI 210/240, and with thermal-expansion valve.
6. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
7. Fan Motors: Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION EQUIPMENT for multi-tapped, multi-speed motors with internal thermal protection and permanent lubrication.
8. Disposable Filters: 25 mm (1 inch) thick, in fiberboard frames with MERV rating of 7 or higher according to ASHRAE 52.2.
9. Wiring Terminations: Connect motor to chassis wiring with plug connection.

C. Floor-Mounting, Evaporator-Fan Components:
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
2. Discharge Grille: Steel with surface-mounted frame welded steel bars forming a linear grille and welded into supporting panel.
3. Insulation: Factory-installed duct liner.
4. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Coils:
   a. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with AHRI 210/240, and with thermal-expansion valve.
7. Fan: Direct drive, centrifugal.
8. Fan Motors: Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION EQUIPMENT for

multi-tapped, multi-speed motors with internal thermal protection and permanent lubrication.

9. Filters: Disposable, with MERV rating of 7 or higher according to ASHRAE 52.2.

F. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Service valves, fittings, and gage ports shall be brass and located outside of the casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
3. Compressor motor with manual-reset, high-pressure switch and automatic-reset, low-pressure switch.
4. Refrigerant: R-410A unless otherwise indicated.
5. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with AHRI 210/240, and with liquid subcooler.
6. Fan: Aluminum, propeller type, directly connected to motor.
7. Motor: Permanently lubricated, with integral thermal-overload protection.
8. Low Ambient Kit: Permit operation down to minus 18 deg C (0 deg F).
9. Mounting Base: Polyethylene.
10. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1 "Energy Standard for Buildings except Low-Rise Residential Buildings."

PART 3 EXECUTION

3.1 INSTALLATION

A. Rooftop Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure rooftop units to structural support with anchor bolts.

B. Install wind and seismic restraints according to manufacturer's written instructions. Wind and seismically restrained vibration isolation roof-curb rails are specified in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

C. Install units level and plumb maintaining manufacturer's recommended clearances and tolerances.
D. Install vibration spring isolators under base of self-contained unit, with minimum static deflection of 25 mm (1 inch) unless otherwise indicated. Refer to Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT
E. Install roof-mounting compressor-condenser components on equipment supports specified in Section 07 72 00, ROOF ACCESSORIES. Anchor units to supports with removable, cadmium-plated fasteners.
F. Install seismic restraints.
G. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 25 mm (1 inch) unless otherwise indicated. Refer to Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.
H. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
I. Install wall sleeves in finished wall assembly and weatherproof. Install and anchor wall sleeves to withstand, without damage seismic forces as required by code.

3.2 CONNECTIONS

A. Verify condensate drainage requirements.
B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
C. Install piping adjacent to units to allow service and maintenance.
D. Connect supply ducts to units with flexible duct connectors specified in Section 23 31 00, HVAC DUCTS and CASINGS.
E. Ground equipment and install power wiring, switches, and controls for self-contained and split systems.
F. Connect refrigerant piping to coils with shutoff valves on the suction and liquid lines at the coil and a union or flange at each connection at the coil and condenser.
G. Install ducts to the units with flexible duct connections.
H. Connect piping with shutoff duty valves on the supply and return side of the coil and unions at all connections and with a throttling valve on the return piping near the coil.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections: After installing units and after electrical circuitry has been energized, test units for compliance with requirements. Inspect for and remove shipping bolts, blocks, and tie-down straps. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP AND TESTING

A. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Resident Engineer and Commissioning Agent. Provide a minimum of 7 days prior notice.

B. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.

3.5 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.6 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS.

---END---

SECTION 23 82 16
AIR COILS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Heating and cooling coils for air handling unit and duct applications

1.2 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES

B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC

C. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS

D. Section 23 09 23, DDC SYSTEMS for HVAC

E. Section 23 31 00, HVAC DUCTS AND CASINGS

F. Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

1.3 QUALITY ASSURANCE

A. Refer to paragraph, QUALITY ASSURANCE, Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Unless specifically exempted by these specifications, heating and cooling coils shall be tested, rated, and certified in accordance with AHRI Standard 4l0 and shall bear the AHRI certification label.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturer's Literature and Data for Heating and Cooling Coils: Submit type, size, arrangements and performance details. Present application ratings in the form of tables, charts or curves.

C. Provide installation, operating and maintenance instructions.

D. Certification Compliance: Evidence of listing in current ARI Directory of Certified Applied Air Conditioning Products.

E. Coils may be submitted with Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.

F. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Conditioning and Refrigeration Institute (AHRI):

Directory of Certified Applied Air Conditioning Products

AHRI 410-2001.....Forced-Circulation Air-Cooling and Air-Heating Coils

C. American Society for Testing and Materials (ASTM):

B75/75M-2019.....Standard Specifications for Seamless Copper Tube

D. National Fire Protection Association (NFPA):

70-2017.....National Electric Code

E. National Electric Manufacturers Association (NEMA):

250-2014.....Enclosures for Electrical Equipment (1,000 Volts Maximum)

F. Underwriters Laboratories, Inc. (UL):

1996-2014.....Electric Duct Heaters

PART 2 - PRODUCTS

2.1 HEATING AND COOLING COILS

A. Conform to ASTM B75 and AHRI 410.

B. Tubes: Minimum 16 mm (0.625 inch) tube diameter; Seamless copper tubing.

C. Fins: 0.1397 mm (0.0055 inch) aluminum or 0.1143 mm (0.0045 inch) copper mechanically bonded or soldered or helically wound around tubing.

D. Headers: Copper, welded steel or cast iron. Provide seamless copper tubing or resistance welded steel tube for volatile refrigerant coils.

E. "U" Bends, Where Used: Machine die-formed, silver brazed to tube ends.

F. Coil Casing: 1.6 mm (l6 gage) galvanized steel with tube supports at 1200 mm (48 inch) maximum spacing. Construct casing to eliminate air bypass and moisture carry-over. Provide duct connection flanges.

G. Pressures kPa (PSIG):

Pressure	Water Coil	Steam Coil	Refrigerant Coil
Test	2070 (300)	1725 (250)	2070 (300)
Working	1380 (200)	520 (75)	1725 (250)

H. Protection: Unless protected by the coil casing, provide cardboard, plywood, or plastic material at the factory to protect tube and finned surfaces during shipping and construction activities.

I. Vents and Drain: Coils that are not vented or drainable by the piping system shall have capped vent/drain connections extended through coil casing.

J. Cooling Coil Condensate Drain Pan: Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS or Section 23 74 13.

K. Dampers: Interlocking opposed blades to completely isolate coil from air flow when unit is in bypass position; 1.6 mm (l6 gage) steel, coated with factory applied corrosion resistant baked enamel finish. Provide damper linkage and pneumatic operator(s) or electric operators. Damper operators shall be of same manufacturer as controls furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.4 VOLATILE REFRIGERANT COILS

A. Continuous circuit, straight tubes, dry expansion type equipped with multi-port distribution header, less expansion valve.

B. Minimum 16 mm (5/8-inch) tube diameter.

C. Designed for EPA approved refrigerants.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow coil manufacturer's instructions for handling, cleaning, installation and piping connections.

B. Comb fins, if damaged. Eliminate air bypass or leakage at coil sections.

3.2 STARTUP AND TESTING

A. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR and Commissioning Agent. Provide a minimum of 7 days prior notice.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.4 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS.

- - - E N D - - -

SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section applies to all sections of Division 26.

B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, panelboards, motor controllers, lighting systems and other items and arrangements for the specified items are shown on the drawings.

D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

A. The latest International Building Code (IBC), Underwriters Laboratories, Inc. (UL), Institute of Electrical and Electronics Engineers (IEEE), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.

B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.3 TEST STANDARDS

A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction

and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.

2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
   a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
   b. Are periodically inspected by a NRTL.
   c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer’s Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.

B. Product Qualification:
   1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
   2. The Government reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt

of notification that service is needed. Submit name and address of service organizations.

1.5 APPLICABLE PUBLICATIONS

A. Applicable publications listed in all Sections of Division 26 shall be the latest issue, unless otherwise noted.

B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.6 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available. Materials and equipment furnished shall be new, and shall have superior quality and freshness.

B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Tests are specified, Factory Tests shall be performed in the factory by the equipment manufacturer, and witnessed by the contractor. In addition, the following requirements shall be complied with:

1. The Government shall have the option of witnessing factory tests. The Contractor shall notify the Government through the COR a minimum of thirty (30) days prior to the manufacturer’s performing of the factory tests.

2. When factory tests are successful, contractor shall furnish four (4) copies of the equipment manufacturer's certified test reports to the COR fourteen (14) days prior to shipment of the equipment, and not more than ninety (90) days after completion of the factory tests.
3. When factory tests are not successful, factory tests shall be repeated in the factory by the equipment manufacturer, and witnessed by the Contractor. The Contractor shall be liable for all additional expenses for the Government to witness factory re-testing.

1.7 VARIATIONS FROM CONTRACT REQUIREMENTS

A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 MATERIALS AND EQUIPMENT PROTECTION

A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be repaired or replaced, as determined by the COR.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

A. All electrical work shall comply with requirements of the latest NFPA 70 (NEC), NFPA 70B, NFPA 70E, NFPA 99, NFPA 110, OSHA Part 1910 subpart J – General Environmental Controls, OSHA Part 1910 subpart K – Medical

and First Aid, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the Contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. However, energized electrical work may be performed only for the non-destructive and non-invasive diagnostic testing(s), or when scheduled outage poses an imminent hazard to patient care, safety, or physical security. In such case, all aspects of energized electrical work, such as the availability of appropriate/correct personal protective equipment (PPE) and the use of PPE, shall comply with the latest NFPA 70E, as well as the following requirements:

1. Only Qualified Person(s) shall perform energized electrical work. Supervisor of Qualified Person(s) shall witness the work of its entirety to ensure compliance with safety requirements and approved work plan.
2. At least two weeks before initiating any energized electrical work, the Contractor and the Qualified Person(s) who is designated to perform the work shall visually inspect, verify and confirm that the work area and electrical equipment can safely accommodate the work involved.
3. At least two weeks before initiating any energized electrical work, the Contractor shall develop and submit a job specific work plan, and energized electrical work request to the COR, and Medical Center’s Chief Engineer or his/her designee. At the minimum, the work plan must include relevant information such as proposed work schedule, area of work, description of work, name(s) of Supervisor and Qualified Person(s) performing the work, equipment to be used, procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
4. Energized electrical work shall begin only after the Contractor has obtained written approval of the work plan, and the energized electrical work request from the COR, and Medical Center’s Chief Engineer or his/her designee. The Contractor shall make these

approved documents present and available at the time and place of energized electrical work.

5. Energized electrical work shall begin only after the Contractor has invited and received acknowledgment from the COR, and Medical Center's Chief Engineer or his/her designee to witness the work.

D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.

F. Coordinate location of equipment and conduit with other trades to minimize interference.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working clearances shall not be less than specified in the NEC.

C. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.

2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

1.11 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards,

switchgear and motor control assemblies, control devices and other significant equipment.

B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.

C. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Label shall show specific and correct information for specific equipment based on its arc flash calculations. Label shall show the followings:

1. Nominal system voltage.
2. Equipment/bus name, date prepared, and manufacturer name and address.
3. Arc flash boundary.
4. Available arc flash incident energy and the corresponding working distance.
5. Minimum arc rating of clothing.
6. Site-specific level of PPE.

1.12 SUBMITTALS

A. Submit to the COR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.

C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.

D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
   1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
   2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
   3. Submit each section separately.

E. The submittals shall include the following:
   1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
   2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.
   3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
   4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.

F. Maintenance and Operation Manuals:
   1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
   2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.

3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
   a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
   b. A control sequence describing start-up, operation, and shutdown.
   c. Description of the function of each principal item of equipment.
   d. Installation instructions.
   e. Safety precautions for operation and maintenance.
   f. Diagrams and illustrations.
   g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
   h. Performance data.
   i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.
   j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.

1.13 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 ACCEPTANCE CHECKS AND TESTS

A. The Contractor shall furnish the instruments, materials, and labor for tests.

B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various

manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.

C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests for the equipment. Repair, replacement, and re-testing shall be accomplished at no additional cost to the Government.

1.15 WARRANTY

A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the COR for the Government.

1.16 INSTRUCTION

A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.

B. Furnish the services of competent and factory-trained instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be factory-trained in operating theory as well as practical operation and maintenance procedures.

C. A training schedule shall be developed and submitted by the Contractor and approved by the COR at least 30 days prior to the planned training.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

---END---

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.2 RELATED WORK

A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-resistant rated construction.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Submit the following data for approval:
      1) Electrical ratings and insulation type for each conductor and cable.
      2) Splicing materials and pulling lubricant.
2. Certifications: Two weeks prior to final inspection, submit the following:
   a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.

b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

B. American Society of Testing Material (ASTM):

D2301-10.....Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

D2304-10.....Test Method for Thermal Endurance of Rigid Electrical Insulating Materials

D3005-10.....Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

C. National Electrical Manufacturers Association (NEMA):

WC 70-09.....Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-14.....Thermoset-Insulated Wires and Cables

83-14.....Thermoplastic-Insulated Wires and Cables

467-13.....Grounding and Bonding Equipment

486A-486B-13.....Wire Connectors

486C-13.....Splicing Wire Connectors

486D-15.....Sealed Wire Connector Systems

486E-15.....Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables

514B-12.....Conduit, Tubing, and Cable Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors and cables shall be in accordance with ASTM, NEMA, NFPA, UL, as specified herein, and as shown on the drawings.

B. All conductors shall be copper.

C. Single Conductor and Cable:

1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
2. No. 8 AWG and larger: Stranded.
3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
4. Insulation: THHN-THWN and XHHW-2.

D. Color Code:

1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
2. No. 8 AWG and larger: Color-coded using one of the following methods:
   a. Solid color insulation or solid color coating.
   b. Stripes, bands, or hash marks of color specified.
   c. Color using 19 mm (0.75 inches) wide tape.
3. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
4. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

5. Lighting circuit “switch legs”, and 3-way and 4-way switch “traveling wires,” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.

2.2 SPLICES

A. Splices shall be in accordance with NEC and UL.

B. Above Ground Splices for No. 10 AWG and Smaller:

1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.

2. The integral insulator shall have a skirt to completely cover the stripped conductors.
3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:
1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be product of the same manufacturer.
4. All bolts, nuts, and washers used with splices shall be zinc-plated steel.

D. Above Ground Splices for 250 kcmil and Larger:
1. Long barrel “butt-splice” or “sleeve” type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be product of the same manufacturer.

E. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

2.3 CONNECTORS AND TERMINATIONS

A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated or cadmium-plated steel.

2.4 CONTROL WIRING

A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG.

B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.5 WIRE LUBRICATING COMPOUND

A. Lubricating compound shall be suitable for the wire insulation and conduit and shall not harden or become adhesive.

B. Shall not be used on conductors for isolated power systems.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

B. Install all conductors in raceway systems.

C. Splice conductors only in outlet boxes, junction boxes,or pullboxes.

D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.

E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.

G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

I. Conductor and Cable Pulling:

J. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.

K. Use nonmetallic pull ropes.

L. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.

M. All conductors in a single conduit shall be pulled simultaneously.

N. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

O. No more than three branch circuits shall be installed in any one conduit.

P. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2 SPLICE AND TERMINATION INSTALLATION

A. Splices and terminations shall be mechanically and electrically secure and tightened to manufacturer's published torque values using a torque screwdriver or wrench.

B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

3.3 CONDUCTOR IDENTIFICATION

A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, and pullboxes, Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

3.4 FEEDER CONDUCTOR IDENTIFICATION

A. In each interior pullbox, install brass tags on all feeder conductors to clearly designate their circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

3.5 EXISTING CONDUCTORS

A. Unless specifically indicated on the plans, existing conductors shall not be reused.

3.6 CONTROL WIRING INSTALLATION

A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.

B. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

3.8 CONTROL WIRING IDENTIFICATION

A. Install a permanent wire marker on each wire at each termination.

B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.

C. Wire markers shall retain their markings after cleaning.

3.10 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests: Inspect physical condition.
2. Electrical tests:
   a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
   b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
   c. Perform phase rotation test on all three-phase circuits.

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.

B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.

C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

D. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low-voltage transformers.

E. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
2. Test Reports:
   a. Two weeks prior to the final inspection, submit ground resistance field test reports to the COR.

3. Certifications:

a. Certification by the Contractor that the grounding equipment has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):

B1-13.....Standard Specification for Hard-Drawn Copper Wire

B3-13.....Standard Specification for Soft or Annealed Copper Wire

B8-11.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

81-12.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

70E-18.....National Electrical Safety Code

99-18.....Health Care Facilities

E. Underwriters Laboratories, Inc. (UL):

44-14 .....Thermoset-Insulated Wires and Cables

83-14 .....Thermoplastic-Insulated Wires and Cables

467-13 .....Grounding and Bonding Equipment

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.

B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.

C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.

D. Insulation: THHN-THWN and XHHW-2.

2.2 GROUND CONNECTIONS

A. Above Grade:

1. Bonding Jumpers: Listed for use with copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Connection to Grounding Bus Bars: Listed for use with copper conductors. Use mechanical type lugs, with zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.3 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

2.4 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.5 GROUNDING BUS BAR

A. Pre-drilled rectangular copper bar with stand-off insulators, minimum 6.3 mm (0.25 inch) thick x 100 mm (4 inches) high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

B. System Grounding:

1. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

A. Panelboards, Motor Control PanelsDisconnect Switches, and other electrical equipment:

1. Connect the equipment grounding conductors to the ground bus.
2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

B. Transformers:

1. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system.

3.3 RACEWAY

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.

3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

D. Wireway Systems:
1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).
3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).

E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a

green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.4 CORROSION INHIBITORS

A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.5 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.6 ELECTRICAL ROOM GROUNDING OR AREA AROUND ELECTRICAL PANELS AND TRANSFORMERS GROUNDING

A. Provide ground bus bar and mounting hardware at each main electrical room or area where incoming feeders are terminated, as shown on the drawings. Connect to pigtail extensions of the building grounding ring, as shown on the drawings.

3.7 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.

B. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

3.8 ACCEPTANCE CHECKS AND TESTS

A. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.

B. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined

resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Below-grade connections shall be visually inspected by the COR prior to backfilling. The Contractor shall notify the COR24 hours before the connections are ready for inspection.

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SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.

B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

A. Section 06 10 00, ROUGH CARPENTRY: Mounting board for telephone closets.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.

C. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.

D. Section 09 91 00, PAINTING: Identification and painting of conduit and other devices.

E. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Conduits bracing.

F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:

a. Size and location of main feeders.

b. Size and location of panels and pull-boxes.

c. Layout of required conduit penetrations through structural elements.

d. Submit the following data for approval:

1) Raceway types and sizes.

2) Conduit bodies, connectors and fittings.

3) Junction and pull boxes, types and sizes

2. Certifications: Two weeks prior to final inspection, submit the following:

a. Certification by the manufacturer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.

b. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Iron and Steel Institute (AISI):

S100-12.....North American Specification for the Design of Cold-Formed Steel Structural Members

C. National Electrical Manufacturers Association (NEMA):

C80.1-15.....Electrical Rigid Steel Conduit

C80.3-15.....Steel Electrical Metal Tubing

C80.6-05.....Electrical Intermediate Metal Conduit

FB1-14.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

FB2.10-13.....Selection and Installation Guidelines for Fittings for use with Non-Flexible Conduit or Tubing (Rigid Metal Conduit, Intermediate Metallic Conduit, and Electrical Metallic Tubing)

FB2.20-14.....Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

1-05.....Flexible Metal Conduit

6-07.....Electrical Rigid Metal Conduit - Steel

50-15.....Enclosures for Electrical Equipment

360-13.....Liquid-Tight Flexible Steel Conduit

467-13.....Grounding and Bonding Equipment

514A-13.....Metallic Outlet Boxes

514B-12.....Conduit, Tubing, and Cable Fittings

797-07.....Electrical Metallic Tubing

1242-14.....Electrical Intermediate Metal Conduit – Steel

PART 2 - PRODUCTS

2.1 MATERIAL

A. Conduit Size: In accordance with the NEC, but not less than 19 mm (0.75-inch) unless otherwise shown. Where permitted by the NEC, 19 mm (0.75-inch) flexible conduit may be used for tap connections to recessed lighting fixtures.

B. Conduit:

1. Size: In accordance with the NEC, but not less than 19 mm (0.75-inch).
2. Rigid Steel Conduit (RMC): Shall conform to UL 6 and NEMA C80.1.
3. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242 and NEMA C80.6.
4. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and NEMA C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
5. Flexible Metal Conduit: Shall conform to UL 1.
6. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.
7. Surface Metal Raceway: Shall conform to UL 5.

C. Conduit Fittings:

1. Rigid Steel and Intermediate Metallic Conduit Fittings:
   a. Fittings shall meet the requirements of UL 514B and NEMA FB1.

b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
e. Erickson (Union-Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

2. Rigid Aluminum Conduit Fittings:
   a. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Malleable iron, steel or aluminum alloy materials; Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4% copper are prohibited.
   b. Locknuts and Bushings: As specified for rigid steel and IMC conduit.
   c. Set Screw Fittings: Not permitted for use with aluminum conduit.
3. Electrical Metallic Tubing Fittings:
   a. Fittings and conduit bodies shall meet the requirements of UL 514B, NEMA C80.3, and NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.
   c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
   d. Indent-type connectors or couplings are prohibited.

e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

4. Flexible Metal Conduit Fittings:
   a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
   b. Clamp-type, with insulated throat.
5. Liquid-tight Flexible Metal Conduit Fittings:
   a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.
   c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
6. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.
7. Expansion and Deflection Couplings:
   a. Conform to UL 467 and UL 514B.
   b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
   c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
   d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.

D. Conduit Supports:
1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple Conduit (Trapeze) Hangers: Not less than 38 mm x 38 mm (1.5 x 1.5 inches), 12-gauge steel, cold-formed, lipped channels; with not less than 9 mm (0.375-inch) diameter steel hanger rods.

4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Junction, and Pull Boxes:
1. Comply with UL-50 and UL-514A.
2. Rustproof cast metal where required by the NEC or shown on drawings.
3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.

F. Metal Wireways: Equip with hinged covers, except as shown on drawings. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:
1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the COR prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the COR where working space is limited.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight, as specified in Section 07 92 00, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

A. In accordance with NEC, NEMA, UL, as shown on drawings, and as specified herein.

B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.

C. Install conduit as follows:

1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut conduits square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
8. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
10. Conduit installations under fume and vent hoods are prohibited.
11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
12. Conduit bodies shall only be used for changes in direction and shall not contain splices.
13. Do not use aluminum conduits in wet locations.

D. Conduit Bends:
1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:
1. Install conduit with wiring, including homeruns, as shown on drawings.

2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the COR.

3.3 CONCEALED WORK INSTALLATION

A. Above Furred or Suspended Ceilings and in Walls:

1. Conduit for Conductors Above 600 V: Rigid steel. Mixing different types of conduits in the same system is prohibited.
2. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 1.8 M (6 feet) of flexible metal conduit extending from a junction box to the fixture.
5. Tightening set screws with pliers is prohibited.
6. For conduits running through metal studs, limit field cut holes to no more than 70% of web depth. Spacing between holes shall be at least 457 mm (18 inches). Cuts or notches in flanges or return lips shall not be permitted.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.

B. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the system is prohibited.

C. Align and run conduit parallel or perpendicular to the building lines.

D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

E. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.

F. Painting:

1. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (2 inch) high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6 M (20 feet) intervals in between.

3.5 WET OR DAMP LOCATIONS

A. Use rigid steel or IMC conduits unless as shown on drawings.

B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.

C. Use rigid steel or IMC conduit within 1.5 M (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.

D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 2.4 M (8 feet) with 9 mm (3/8-inch) galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

3.6 MOTORS AND VIBRATING EQUIPMENT

A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.

B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.

C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

3.7 EXPANSION JOINTS

A. Conduits 75 mm (3 inch) and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

B. Provide conduits smaller than 75 mm (3 inch) with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 125 mm (5 inch) vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding

jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.

C. Install expansion and deflection couplings where shown.

D. Seismic Areas: In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 375 mm (15 inches) of slack flexible conduit. Flexible conduit shall have a copper bonding jumper installed.

3.8 CONDUIT SUPPORTS

A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 90 kg (200 lbs). Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Fasteners and Supports in Solid Masonry and Concrete:

1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
2. Existing Construction:
   a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
   b. Power set fasteners not less than 6 mm (0.25-inch) diameter with depth of penetration not less than 75 mm (3 inch).
   c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.

F. Hollow Masonry: Toggle bolts.

G. Bolts supported only by plaster or gypsum wallboard are not acceptable.

H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.

L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION

A. Boxes for Concealed Conduits:
   1. Flush-mounted.
   2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.

B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.

C. Locate pullboxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.

D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

E. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 600 mm (24 inch) center-to-center lateral spacing shall be maintained between boxes.

F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.

G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 100 mm (4 inches) square x 55 mm (2.125 inches) deep, with device covers for the wall material and thickness involved.

H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example: "SIG-FA JB No. 1."

I. On all branch circuit junction box covers, identify the circuits with black marker.

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SECTION 26 05 73
OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the overcurrent protective device coordination study, related calculations and analysis, indicated as the study in this section.

B. A short-circuit and selective coordination study, and arc flash calculations and analysis shall be prepared for the electrical overcurrent devices to be installed under this project.

C. The study shall present a well-coordinated time-current analysis of each overcurrent protective device from the individual device. upstream to source panels and distribution panels.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.

B. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. The study shall be prepared by the equipment manufacturer, and performed by the equipment manufacturer’s licensed electrical engineer.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Product data on the software program to be used for the study. Software shall be in mainstream use in the industry, shall provide device settings and ratings, and shall show selective coordination by time-current drawings.
2. Complete study as described in paragraph 1.6. Submittal of the study shall be well-coordinated with submittals of the shop drawings for equipment in related specification sections.
3. Certifications: Two weeks prior to final inspection, submit the following.

a. Certification by the Contractor that the overcurrent protective devices have been set in accordance with the approved study.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. Institute of Electrical and Electronics Engineers (IEEE):

241-90.....Recommended Practice Electrical Systems in Commercial Buildings

242-03.....Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

399-97.....Recommended Practice for Industrial and Commercial Power Systems Analysis

1584-02.....Performing Arc-Flash Hazards Calculations

1584A-04.....Performing Arc-Flash Hazards Calculations – Amendment 1

1584B-11.....Performing Arc-Flash Hazards Calculations – Amendment 2

C. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

70E-18.....Standard for Electrical Safety in the Workplace

99-18.....Health Care Facilities Code

1.6 STUDY REQUIREMENTS

A. The study shall be in accordance with IEEE and NFPA standards.

B. The study shall include one line diagram, short-circuit and ground fault analysis, protective coordination plots for all overcurrent protective devices, and arc flash calculations and analysis.

C. One Line Diagram:

1. Show all electrical equipment and wiring to be protected by the overcurrent devices.
2. Show the following specific information:
   a. Calculated fault impedance, X/R ratios, and short-circuit values at each feeder and branch circuit bus.
   b. Relay, circuit breaker, and fuse ratings.
   c. Voltage at each bus.

d. Identification of each bus, matching the identification on the drawings.
e. Conduit, conductor, and busway material, size, length, and X/R ratios.

D. Short-Circuit Study:
1. The study shall be performed using computer software designed for this purpose. Pertinent data and the rationale employed in developing the calculations shall be described in the introductory remarks of the study.
2. Calculate the fault impedance to determine the available short-circuit and ground fault currents at each bus. Incorporate applicable motor and/or generator contribution in determining the momentary and interrupting ratings of the overcurrent protective devices.
3. Present the results of the short-circuit study in a table. Include the following:
a. Device identification.
b. Operating voltage.
c. Overcurrent protective device type and rating.
d. Calculated short-circuit current.

E. Coordination Study:
1. Prepare the coordination curves to determine the required settings of overcurrent protective devices to demonstrate selective coordination. Graphically illustrate on log-log paper that adequate time separation exists between devices, including the utility company upstream device if applicable. Plot the specific time-current characteristics of each overcurrent protective device in such a manner that all devices are clearly depicted.
2. The following specific information shall also be shown on the coordination curves:
a. Device identification.
b. Potential transformer and current transformer ratios.
c. Three-phase and single-phase ANSI damage points or curves for each cable, transformer, or generator.
d. Applicable circuit breaker or protective relay characteristic curves.
e. No-damage, melting, and clearing curves for fuses.

f. Transformer in-rush points.

3. Develop a table to summarize the settings selected for the overcurrent protective devices. Include the following in the table:
   a. Device identification.
   b. Protective relay or circuit breaker potential and current transformer ratios, sensor rating, and available and suggested pickup and delay settings for each available trip characteristic.
   c. Fuse rating and type.

F. Arc Flash Calculations and Analysis:

1. Arc flash warning labels shall comply with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS
2. Arc flash calculations shall be based on actual over-current protective device clearing time. Maximum clearing time shall be in accordance with IEEE 1584.
3. Arc flash analysis shall be based on the lowest clearing time setting of the over-current protective device to minimize the incident energy level without compromising selective coordination.
4. Arc flash boundary and available arc flash incident energy at the corresponding working distance shall be calculated for all electrical power distribution equipment specified in the project, and as shown on the drawings.
5. Required arc-rated clothing and other PPE shall be selected and specified in accordance with NFPA 70E.

1.7 ANALYSIS

A. Analyze the short-circuit calculations, and highlight any equipment determined to be underrated as specified. Propose solutions to effectively protect the underrated equipment.

1.8 ADJUSTMENTS, SETTINGS, AND MODIFICATIONS

A. Final field settings and minor modifications of the overcurrent protective devices shall be made to conform with the study, without additional cost to the Government.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

---END---

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of low-voltage dry-type general-purpose transformers, indicated as transformers in this section.

1.2 RELATED WORK

A. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of nonstructural components.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, temperature rise, wiring and connection diagrams, plan, front, side, and rear elevations, accessories, and device nameplate data.
   c. Certification from the manufacturer that representative transformers have been seismically tested to International Building Code requirements. Certification shall be based upon

simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

2. Manuals:
   a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets and wiring diagrams.
      1) Schematic signal and control diagrams, with all terminals identified, matching terminal identification in the transformers.
      2) Include information for testing, repair, troubleshooting, assembly, disassembly, and factory recommended/required periodic maintenance procedures and frequency.
   b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the transformers conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the transformers have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):
IBC-15.....International Building Code

C. National Fire Protection Association (NFPA):
70-17.....National Electrical Code (NEC)

D. National Electrical Manufacturers Association (NEMA):
TR 1-13.....Transformers, Step Voltage Regulators and Reactors
ST 20-14.....Dry Type Transformers for General Applications

E. Underwriters Laboratories, Inc. (UL):
UL 506-17.....Standard for Specialty Transformers
UL 1561-11.....Dry-Type General Purpose and Power Transformers

F. United States Department of Energy:

10 CFR Part 431.....Energy Efficiency Program for Certain Commercial and Industrial Equipment

PART 2 - PRODUCTS

2.1 TRANSFORMERS

A. Unless otherwise specified, transformers shall be in accordance with NEMA, NFPA, UL and as shown on the drawings.

B. Transformers shall have the following features:

1. Self-cooled by natural convection, isolating windings, indoor dry-type. Autotransformers will not be accepted, except as specifically allowed for buck-boost applications.
2. Rating and winding connections shall be as shown on the drawings.
3. Ratings shown on the drawings are for continuous duty without the use of cooling fans.
4. Copper windings.
5. Insulation systems:
   a. Transformers 30 kVA and larger: UL rated 220 °C (428 °F) system with an average maximum rise by resistance of 80 °C (302 °F) in a maximum ambient of 40 °C (104 °F).
   b. Transformers below 30 kVA: Same as for 30 kVA and larger or UL rated 185 °C (365 °F) system with an average maximum rise by resistance of 115 °C (239 °F) in a maximum ambient of 40 °C (104 °F).
6. Core and coil assemblies:
   a. Rigidly braced to withstand the stresses caused by short-circuit currents and rough handling during shipment.
   b. Cores shall be grain-oriented, non-aging, and silicon steel.
   c. Coils shall be continuous windings without splices except for taps.
   d. Coil loss and core loss shall be minimized for efficient operation.
   e. Primary and secondary tap connections shall be brazed or pressure type.
   f. Coil windings shall have end filters or tie-downs for maximum strength.
7. Average audible sound levels shall comply with NEMA.

8. If not shown on drawings, nominal impedance shall be as permitted by NEMA.
9. Single phase transformers rated 15 kVA through 25 kVA shall have two 5% full capacity taps below normal rated primary voltage. All transformers rated 30 kVA and larger shall have two 2.5% full capacity taps above, and four 2.5% full capacity taps below normal rated primary voltage.
10. Core assemblies shall be grounded to their enclosures with adequate flexible ground straps.
11. Enclosures:
    a. Comprised of not less than code gauge steel.
    b. Temperature rise at hottest spot shall conform to NEMA Standards and shall not bake and peel off the enclosure paint after the transformer has been placed in service.
    c. Ventilation openings shall prevent accidental access to live components.
    d. The enclosure at the factory shall be thoroughly cleaned and painted with manufacturer's prime coat and standard finish.
12. Standard NEMA features and accessories, including ground pad, lifting provisions, and nameplate with the wiring diagram and sound level indicated.
13. Dimensions and configurations shall conform to the spaces designated for their installations.
14. Transformers shall meet the energy conservation standards for transformers per the United States Department of Energy’s 10 CFR Part 431.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of transformers shall be in accordance with the NEC, as recommended by the equipment manufacturer and as shown on the drawings.
B. Anchor transformers with rustproof bolts, nuts, and washers, in accordance with manufacturer’s instructions, and as shown on drawings.
C. In seismic areas, transformers shall be adequately anchored and braced per details on structural contract drawings to withstand the seismic forces at the location where installed.

D. Install transformers with manufacturer's recommended clearance from wall and adjacent equipment for air circulation. Minimum clearance shall be 150 mm (6 inches).

E. Install transformers on vibration pads designed to suppress transformer noise and vibrations.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform tests in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

a. Compare equipment nameplate data with specifications and approved shop drawings.

b. Inspect physical and mechanical condition.

c. Inspect all field-installed bolted electrical connections, using the calibrated torque-wrench method to verify tightness of accessible bolted electrical connections.

d. Perform specific inspections and mechanical tests as recommended by manufacturer.

e. Verify correct equipment grounding.

f. Verify proper secondary phase-to-phase and phase-to-neutral voltage after energization and prior to connection to loads.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the contractor shall demonstrate that the transformers are in good operating condition, and properly performing the intended function.

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SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of panelboards.

1.2 RELATED WORK

A. Section 09 91 00, PAINTING: Painting of panelboards.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.

C. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

D. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

F. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

G. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study, and requirements for a coordinated electrical system.

H. Section 26 43 13, SURGE PROTECTIVE DEVICES: Surge protective devices integral to panelboards.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:

a. Submit sufficient information to demonstrate compliance with drawings and specifications.

b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit

breakers, wiring and connection diagrams, accessories, and nameplate data.

c. Certification from the manufacturer that a representative panelboard has been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

2. Manuals:

a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.

1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.

2) Include information for testing, repair, troubleshooting, assembly, and disassembly.

b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.

a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.

b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):

IBC-15.....International Building Code

C. National Electrical Manufacturers Association (NEMA):

PB 1-11.....Panelboards

250-14.....Enclosures for Electrical Equipment (1,000V Maximum)

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

70E-18.....Standard for Electrical Safety in the Workplace

E. Underwriters Laboratories, Inc. (UL):

50-15.....Enclosures for Electrical Equipment

67-09.....Panelboards

489-16.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.

B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.

C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.

D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.

E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.

F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they shall be connected.

G. Neutral bus shall be copper and 100%rated, mounted on insulated supports.

H. Grounding bus bar shall be copper and equipped with screws or lugs for the connection of equipment grounding conductors.

I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.

J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type

panelboards and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.

K. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS

A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

1. Hinged "door-in-door" type.
2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
4. Inner and outer doors shall open left to right.
5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

B. Circuit breakers shall be bolt-on type.

C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:

1. 120/208 V Panelboard: 10,000 A symmetrical.
2. 120/240 V Panelboard: 10,000 A symmetrical.
3. 277/480 V Panelboard: 14,000 A symmetrical.

D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker trip setting shall be set in the field.

Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.

E. Circuit breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.
10. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory accordingly.

2.4 SURGE PROTECTIVE DEVICES

A. Where shown on the drawings, furnish panelboards with integral surge protective devices. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturer’s instructions, the NEC, as shown on the drawings, and as specified.

B. Locate panelboards so that the present and future conduits can be conveniently connected.

C. In seismic areas, panelboards shall be adequately anchored and braced per details on structural contract drawings to withstand the seismic forces at the location where installed.

D. Install a printed schedule of circuits in each panelboard after approval by the COR. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards

E. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).

F. Provide blank cover for each unused circuit breaker mounting space.

G. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

a. Compare equipment nameplate data with specifications and approved shop drawings.

b. Inspect physical, electrical, and mechanical condition.

c. Verify appropriate anchorage and required area clearances.

d. Verify that circuit breaker sizes and types correspond to approved shop drawings.

e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.

f. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

---END---

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of wiring devices.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

E. Section 26 51 00, INTERIOR LIGHTING: Fluorescent ballasts and LED drivers for use with manual dimming controls.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Include electrical ratings, dimensions, mounting details, construction materials, grade, and termination information.
2. Manuals:
   a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and information for ordering replacement parts.

b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the wiring devices conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the wiring devices have been properly installed and adjusted.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. National Electrical Manufacturers Association (NEMA):

WD 1-99(R2015).....General Color Requirements for Wiring Devices
WD 6-16 .....Wiring Devices – Dimensional Specifications

C. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)
99-18.....Health Care Facilities

D. Underwriter’s Laboratories, Inc. (UL):

20-10.....General-Use Snap Switches
231-16.....Power Outlets
467-13.....Grounding and Bonding Equipment
498-17.....Attachment Plugs and Receptacles
943-16.....Ground-Fault Circuit-Interrupters
1449-14.....Surge Protective Devices

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. General: All receptacles shall comply with NEMA, NFPA, UL, and as shown on the drawings.

1. Mounting straps shall be nickel plated brass, brass, nickel plated steel or galvanize steel with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.

2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.

B. Duplex Receptacles - Hospital-grade: shall be listed for hospital grade, single phase, 20 ampere, 120 volts, 2-pole, 3-wire, NEMA 5-20R, with break-off feature for two-circuit operation.
   1. Bodies shall be ivory in color.
   2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The lower receptacle shall be unswitched.
   3. Duplex Receptacles on Emergency Circuit:
      a. Duplex Receptacles on Emergency circuits shall be RED.
   4. Ground Fault Current Interrupter (GFCI) Duplex Receptacles: Shall be an integral unit, hospital-grade, suitable for mounting in a standard outlet box, with end-of-life indication and provisions to isolate the face due to improper wiring. GFCI receptacles shall be self-test receptacles in accordance with UL 943.
      a. Ground fault interrupter shall consist of a differential current transformer, self-test, solid state sensing circuitry and a circuit interrupter switch. Device shall have nominal sensitivity to ground leakage current of 4-6 milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes (+ or – 1 milliampere) on the load side of the device. Device shall have a minimum nominal tripping time of 0.025 second.
      b. Self-test function shall be automatically initiated within 5 seconds after power is activated to the receptacles. Self-test function shall be periodically and automatically performed every 3 hours or less.
      c. End-of-life indicator light shall be a persistent flashing or blinking light to indicate that the GFCI receptacle is no longer in service.

C. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. The weatherproof integrity shall not be affected when heavy duty specification or hospital grade

attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.

2.2 TOGGLE SWITCHES

A. Toggle switches shall be totally enclosed tumbler type with nylon bodies. Handles shall be ivory or RED (if on Emergency Generator circuit) in color unless otherwise specified or shown on the drawings.
   1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self-grounding mounting strap with break-off plasters ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
   2. Switches shall be rated 20 amperes at 120-277 Volts AC.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be type 302 stainless steel or smooth nylon. Oversize plates are not acceptable.
B. Color shall be ivory unless otherwise specified.
C. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
D. Duplex Receptacles on Emergency Circuit: Wall plates shall be red nylon with the word "EMERGENCY" engraved in 6 mm (1/4 inch) white letters. Or, Wall plates shall be type 302 stainless steel, with the word “EMERGENCY” engraved in 6 mm (1/4 inch) red letters.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC and as shown as on the drawings.
B. Install wiring devices after wall construction and painting is complete.
C. The ground terminal of each wiring device shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the branch circuit equipment grounding conductor.
D. Outlet boxes for toggle switches shall be mounted on the strike side of doors.
E. Provide barriers in multi-gang outlet boxes to comply with the NEC.
F. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special

attention to installations in cabinet work, and in connection with laboratory equipment.

G. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades.

H. Install wall switches 1.2 M (48 inches) above floor, with the toggle OFF position down.

I. Install receptacles 450 mm (18 inches) above floor, and 152 mm (6 inches) above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.

J. Install horizontally mounted receptacles with the ground pin to the right.

K. When required or recommended by the manufacturer, use a torque screwdriver. Tighten unused terminal screws.

L. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform manufacturer’s required field checks in accordance with the manufacturer's recommendations, and the latest NFPA 99. In addition, include the following:

1. Visual Inspection and Tests:
   a. Inspect physical and electrical conditions.
   b. Vacuum-clean surface metal raceway interior. Clean metal raceway exterior.
   c. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
   d. Test GFCI receptacles.
2. Receptacle testing in the Patient Care Spaces, such as retention force of the grounding blade of each receptacle, shall comply with the latest NFPA 99.

---END---

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SECTION 26 29 11
MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of motor controllers, including low-voltage variable speed motor controllers.

B. Motor controllers, whether furnished with the equipment specified in other sections or otherwise (with the exception of elevator motor controllers specified in Division 14), shall meet this specification and all related specifications.

1.2 RELATED WORK

A. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint for nonstructural components.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Include electrical ratings, dimensions, weights, mounting details, materials, overcurrent protection devices, overload relays, sizes of enclosures, wiring diagrams, starting characteristics, interlocking, and accessories.

c. Certification from the manufacturer that representative motor controllers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

2. Manuals:
   a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
      1) Wiring diagrams shall have their terminals identified to facilitate installation, maintenance, and operation.
      2) Wiring diagrams shall indicate internal wiring for each item of equipment and interconnections between the items of equipment.
      3) Elementary schematic diagrams shall be provided for clarity of operation.
      4) Include the catalog numbers for the correct sizes of overload relays for the motor controllers.
   b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the motor controllers conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the motor controllers have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. Institute of Electrical and Electronic Engineers (IEEE):
519-14.....Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems

C37.90.1-12.....Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

C. International Code Council (ICC):

IBC-15.....International Building Code

D. National Electrical Manufacturers Association (NEMA):

ICS 1-00(R2015).....Industrial Control and Systems: General Requirements

ICS 1.1-84(R2015).....Safety Guidelines for the Application, Installation and Maintenance of Solid State Control

ICS 2-00(R2005).....Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts

ICS 4-15.....Industrial Control and Systems: Terminal Blocks

ICS 6-93(R2016).....Industrial Control and Systems: Enclosures

ICS 7-14.....Industrial Control and Systems: Adjustable-Speed Drives

ICS 7.1-14.....Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems

E. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

F. Underwriters Laboratories Inc. (UL):

508A-13.....Industrial Control Panels

508C-16.....Power Conversion Equipment

1449-14.....Surge Protective Devices

PART 2 - PRODUCTS

2.1 MOTOR CONTROLLERS

A. Motor controllers shall comply with IEEE, NEMA, NFPA, UL, and as shown on the drawings.

B. Motor controllers shall be separately enclosed, unless part of another assembly. For installation in motor control centers, provide plug-in, draw-out type motor controllers up through NEMA size 4. NEMA size 5 and above require bolted connections.

C. Motor controllers shall be combination type, with magnetic controller per Paragraph 2.3 below and with circuit breaker, fused switch, or motor circuit protector disconnecting means, with external operating

handle with lock-open padlocking positions and ON-OFF position indicator.

1. Circuit Breakers:
   a. Bolt-on thermal-magnetic type with a minimum interrupting rating as indicated on the drawings.
   b. Equipped with automatic, trip free, non-adjustable, inverse-time, and instantaneous magnetic trips for less than 400A. The magnetic trip shall be adjustable from 5x to 10x for breakers 400A and greater.
   c. Additional features shall be as follows:
      1) A rugged, integral housing of molded insulating material.
      2) Silver alloy contacts.
      3) Arc quenchers and phase barriers for each pole.
      4) Quick-make, quick-break, operating mechanisms.
      5) A trip element for each pole, a common trip bar for all poles, and one operator for all poles.
2. Fused Switches:
   a. Quick-make, quick-break type.
   b. Minimum duty rating shall be NEMA classification General Duty (GD) for 240 Volts and NEMA classification Heavy Duty (HD) for 480 Volts.
   c. Horsepower rated, and shall have the following features:
      1) Copper blades, visible in the OFF position.
      2) An arc chute for each pole.
      3) Fuse holders for the sizes and types of fuses specified or as shown on the drawings.
3. Motor Circuit Protectors:
   a. Magnetic trip only.
   b. Bolt-on type with a minimum interrupting rating as indicated on the drawings.
   c. Equipped with automatic, adjustable magnetic trip. Magnetic trip shall be adjustable up to 1300% of the motor full load amperes.

D. Enclosures:
1. Enclosures shall be NEMA-type rated 1, 3R, or 12 as indicated on the drawings or as required per the installed environment.
2. Enclosure doors shall be interlocked to prevent opening unless the disconnecting means is open. A "defeater" mechanism shall allow for

inspection by qualified personnel with the disconnect means closed. Provide padlocking provisions.

3. All metal surfaces shall be thoroughly cleaned, phosphatized, and factory primed prior to applying light gray baked enamel finish.

E. Motor control circuits:

1. Shall operate at not more than 120 Volts.
2. Shall be grounded, except where the equipment manufacturer recommends that the control circuits be isolated.
3. For each motor operating over 120 Volts, incorporate a separate, heavy duty, control transformer within each motor controller enclosure.
4. Incorporate primary and secondary overcurrent protection for the control power transformers.

F. Overload relays:

1. Thermal or Induction Temperature Probe Thermal Relay Electronic type. Devices shall be NEMA type.
2. One for each pole.
3. External overload relay reset pushbutton on the door of each motor controller enclosure.
4. Overload relays shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
5. Thermal overload relays shall be tamperproof, not affected by vibration, manual reset, sensitive to single-phasing, and shall have selectable trip classes of 10, 20 and 30.
6. Induction overload relays shall have changeable heater elements, manual reset, ambient temperature compensation, sensitivity to single-phasing, and shall have selectable trip classes of 10, 20 and 30.
7. Temperature probe relays shall be connected to thermistors or resistance temperature detectors (RTD) embedded in the motor winding.
8. Electronic overload relays shall utilize internal current transformers and electro-mechanical components. The relays shall have ambient temperature compensation, single-phase protection, manual or automatic reset, and trip classes of 10, 15, 20 and 30.

The relay shall provide fault cause indication, including jam/stall, ground fault, phase loss, and overload.

G. Hand-Off-Automatic (H-O-A) switch is required unless specifically stated on the drawings as not required for a particular controller. H-O-A switch shall be operable without opening enclosure door. H-O-A switch is not required for manual motor controllers.

H. Incorporate into each control circuit a 120 Volt, electronic time-delay relay (ON delay), minimum adjustable range from 0.3 to 10 minutes, with transient protection. Time-delay relay is not required where H-O-A switch is not required.

I. Unless noted otherwise, equip each motor controller with not less than two normally open (N.O.) and two normally closed (N.C.) auxiliary contacts.

J. Provide green (RUN) and red (STOP) pilot lights.

K. Motor controllers incorporated within equipment assemblies shall also be designed for the specific requirements of the assemblies.

L. Additional requirements for specific motor controllers, as indicated in other specification sections, shall also apply.

2.2 MAGNETIC MOTOR CONTROLLERS

A. Shall be in accordance with applicable requirements of 2.1 above.

B. Controllers shall be general-purpose, Class A magnetic controllers for induction motors rated in horsepower. Minimum NEMA size 0.

C. Where combination motor controllers are used, combine controller with protective or disconnect device in a common enclosure.

D. Provide phase loss protection for each controller, with contacts to de-energize the controller upon loss of any phase.

E. Unless otherwise indicated, provide full voltage non-reversing across-the-line mechanisms for motors less than 25 HP, closed by coil action and opened by gravity. For motors 25 HP and larger, provide reduced-voltage or variable speed controllers as shown on the drawings. Equip controllers with 120 VAC coils and individual control transformer unless otherwise noted.

2.3 REDUCED VOLTAGE MOTOR CONTROLLERS

A. Shall be in accordance with applicable portions of 2.1 above.

B. Shall have closed circuit transition.

C. Shall limit inrush currents to not more than 70 percent of the locked rotor current.

D. Provide phase loss protection for each motor controller, with contacts to de-energize the motor controller upon loss of any phase.

2.4 LOW-VOLTAGE VARIABLE SPEED MOTOR CONTROLLERS (VSMC)

A. VSMC shall be in accordance with applicable portions of 2.1 above.

B. VSMC shall be electronic, with adjustable frequency and voltage, three phase output, capable of driving standard NEMA B three-phase induction motors at full rated speed. The control technique shall be pulse width modulation (PWM), where the VSMC utilizes a full wave bridge design incorporating diode rectifier circuitry. Silicon controlled rectifiers or other control techniques are not acceptable.

C. VSMC shall be suitable for variable torque loads and shall be capable of providing sufficient torque to allow the motor to break away from rest upon first application of power.

D. VSMC shall be capable of operating within voltage parameters of plus 10 to minus 15 percent of line voltage and be suitably rated for the full load amps of the maximum watts (HP) within its class.

E. Minimum efficiency shall be 95 percent at 100 percent speed and 85 percent at 50 percent speed.

F. The displacement power factor of the VSMC shall not be less than 95 percent under any speed or load condition.

G. VSMC current and voltage harmonic distortion shall not exceed the values allowed by IEEE 519.

H. Operating and Design Conditions:

1. Elevation: 5400 feet Above Mean Sea Level (AMSL)
2. Temperatures: Maximum +90°F Minimum -10°F
3. Relative Humidity: 95%
4. VSMC Location: Air conditioned space

I. VSMC shall have the following features:

1. Isolated power for control circuits.
2. Manually resettable overload protection for each phase.
3. Adjustable current limiting circuitry to provide soft motor starting. Maximum starting current shall not exceed 200 percent of motor full load current.
4. Independent acceleration and deceleration time adjustment, manually adjustable from 2 to 2000 seconds. Set timers to the equipment manufacturer's recommended time in the above range.

5. Control input circuitry that will accept 4 to 20 mA current or 0-10 VDC voltage control signals from an external source.
6. Automatic frequency adjustment from 1 Hz to 300 Hz.
7. Circuitry to initiate an orderly shutdown when any of the conditions listed below occur. The VSMC shall not be damaged by any of these electrical disturbances and shall automatically restart when the conditions are corrected. The VSMC shall be able to restart into a rotating motor operating in either the forward or reverse direction and matching that frequency.
   a. Incorrect phase sequence.
   b. Single phasing.
   c. Overvoltage in excess of 10 percent.
   d. Undervoltage in excess of 15 percent.
   e. Running overcurrent above 110 percent (VSMC shall not automatically reset for this condition.)
   f. Instantaneous overcurrent above 150 percent (VSMC shall not automatically reset for this condition).
   g. Short duration power outages of 12 cycles or less (i.e., distribution line switching, generator testing, and automatic transfer switch operations.)
8. Automatic Reset/Restart: Attempt three restarts after VSMC fault or on return of power after an interruption and before shutting down for manual reset or fault correction, with adjustable delay time between restart attempts.
9. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
10. Bidirectional Autospeed Search: Capable of starting VSMC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to VSMC, motor, or load.

J. VSMC shall include an input circuit breaker which will disconnect all input power, interlocked with the door so that the door cannot be opened with the circuit breaker in the closed position.

K. VSMC shall include a 5% line reactor and a RFI/EMI filter.

L. Surge Suppression: Provide three-phase protection against damage from supply voltage surges in accordance with UL 1449.

M. VSMC shall include front-accessible operator station, with sealed keypad and digital display, which allows complete programming, operating, monitoring, and diagnostic capabilities.
   1. Typical control functions shall include but not be limited to:
      a. HAND-OFF-AUTOMATIC-RESET, with manual speed control in HAND mode.
      b. NORMAL-BYPASS.
      c. NORMAL-TEST, which allows testing and adjusting of the VSMC while in bypass mode.
   2. Typical monitoring functions shall include but not be limited to:
      a. Output frequency (Hz).
      b. Motor speed and status (run, stop, fault).
      c. Output voltage and current.
   3. Typical fault and alarm functions shall include but not be limited to:
      a. Loss of input signal, under- and over-voltage, inverter overcurrent, motor overload, critical frequency rejection with selectable and adjustable deadbands, instantaneous line-to-line and line-to-ground overcurrent, loss-of-phase, reverse-phase, and short circuit.
      b. System protection indicators indicating that the system has shutdown and will not automatically restart.

N. VSMC shall include two N.O. and two N.C. dry contacts rated 120 Volts, 10 amperes, 60 Hz.

O. Hardware, software, network interfaces, gateways, and programming to control and monitor the VSMC by control systems specified in other specification sections, including but not limited to Divisions 22 and 23.

P. Network communications ports: As required for connectivity to control systems specified in other specification sections, including but not limited to Divisions 22 and 23.

Q. Communications protocols: As required for communications with control systems specified in other specification sections, including but not limited to Divisions 22 and 23.

R. Bypass controller: Provide contactor-style bypass, arranged to bypass the inverter.
   1. Inverter Output Contactor and Bypass Contactor: Load-break NEMA-rated contactor.

2. Motor overload relays.
3. HAND-OFF-AUTOMATIC bypass control.

S. Bypass operation: Transfers motor between inverter output and bypass circuit, manually, automatically, or both. VSMC shall be capable of stable operation (starting, stopping, and running), and control by fire alarm and detection systems, with motor completely disconnected from the inverter output. Transfer between inverter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.

T. Inverter Isolating Switch: Provide non-load-break switch arranged to isolate inverter and permit safe troubleshooting and testing of the inverter, both energized and de-energized, while motor is operating in bypass mode. Include padlockable, door-mounted handle mechanism.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install motor controllers in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.

B. In seismic areas, motor controllers shall be adequately anchored and braced per details on structural contract drawings to withstand the seismic forces at the location where installed.

C. Install manual motor controllers in flush enclosures in finished areas.

D. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and electronic overload relay pickup and trip ranges.

E. Program variable speed motor controllers per the manufacturer’s instructions and in coordination with other trades so that a complete and functional system is delivered.

F. Adjust trip settings of circuit breakers and motor circuit protectors with adjustable instantaneous trip elements. Initially adjust at six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficiency motors if required). Where these maximum settings do not allow starting of a motor, notify COR before increasing settings.

G. Set the taps on reduced-voltage autotransformer controllers at 50, 65, or 80 percent of line voltage.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform manufacturer’s required field tests in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:
   a. Compare equipment nameplate data with specifications and approved shop drawings.
   b. Inspect physical, electrical, and mechanical condition.
   c. Verify appropriate anchorage, required area clearances, and correct alignment.
   d. Verify that circuit breaker, motor circuit protector, and fuse sizes and types correspond to approved shop drawings.
   e. Verify overload relay ratings are correct.
   f. Vacuum-clean enclosure interior. Clean enclosure exterior.
   g. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer’s published data.
   h. Test all control and safety features of the motor controllers.
   i. For low-voltage variable speed motor controllers, final programming and connections shall be by a factory-trained technician. Set all programmable functions of the variable speed motor controllers to meet the requirements and conditions of use.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that the motor controllers are in good operating condition and properly performing the intended functions.

3.4 SPARE PARTS

A. Two weeks prior to the final inspection, provide one complete set of spare fuses for each motor controller.

3.5 INSTRUCTION

A. Furnish the services of a factory-trained technician for two 4-hour training periods for instructing personnel in the maintenance and operation of the motor controllers, on the dates requested by the COR.

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SECTION 26 29 21
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of fused and unfused disconnect switches (indicated as switches in this section), and separately-enclosed circuit breakers for use in electrical systems rated 600 V and below.

1.2 RELATED WORK

A. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground faults.

E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

F. Section 26 24 16, PANELBOARDS: Molded-case circuit breakers.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Submit the following data for approval:
      1) Electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, fuses, circuit breakers, wiring and connection diagrams, accessories, and device nameplate data.

c. Certification from the manufacturer that representative enclosed switches and circuit breakers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

2. Manuals:
   a. Submit complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering fuses, circuit breakers, and replacement parts.
      1) Include schematic diagrams, with all terminals identified, matching terminal identification in the enclosed switches and circuit breakers.
      2) Include information for testing, repair, troubleshooting, assembly, and disassembly.
   b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the enclosed switches and circuit breakers conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the enclosed switches and circuit breakers have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):
IBC-15.....International Building Code

C. National Electrical Manufacturers Association (NEMA):
FU l-12.....Low Voltage Cartridge Fuses
KS l-13.....Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum)

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

98-16.....Enclosed and Dead-Front Switches

248 1-11.....Low Voltage Fuses

489-13.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 FUSED SWITCHES RATED 600 AMPERES AND LESS

A. Switches shall be in accordance with NEMA, NEC, UL, as specified, and as shown on the drawings.

B. Shall be NEMA classified General Duty (GD) for 240 V switches, and NEMA classified Heavy Duty (HD) for 480 V switches.

C. Shall be horsepower (HP) rated.

D. Shall have the following features:

1. Switch mechanism shall be the quick-make, quick-break type.
2. Copper blades, visible in the open position.
3. An arc chute for each pole.
4. External operating handle shall indicate open and closed positions and have lock-open padlocking provisions.
5. Mechanical interlock shall permit opening of the door only when the switch is in the open position, defeatable to permit inspection.
6. Fuse holders for the sizes and types of fuses specified.
7. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.
8. Ground lugs for each ground conductor.
9. Enclosures:
   a. Shall be the NEMA types shown on the drawings.
   b. Where the types of switch enclosures are not shown, they shall be the NEMA types most suitable for the ambient environmental conditions.
   c. Shall be finished with manufacturer’s standard gray baked enamel paint over pretreated steel.
10. Electrically operated switches shall only be installed where shown on the drawings.

2.2 UNFUSED SWITCHES RATED 600 AMPERES AND LESS

A. Shall be the same as fused switches, but without provisions for fuses.

2.3 FUSED SWITCHES RATED OVER 600 AMPERES TO 1200 AMPERES

A. Shall be the same as fused switches and shall be NEMA classified Heavy Duty (HD).

2.4 MOTOR RATED TOGGLE SWITCHES

A. Type 1, general purpose for single-phase motors rated up to 1 horsepower.

B. Quick-make, quick-break toggle switch with external reset button and thermal overload protection matched to nameplate full-load current of actual protected motor.

2.5 CARTRIDGE FUSES

A. Shall be in accordance with NEMA FU 1.

B. Feeders: Class L, fast acting.

C. Motor Branch Circuits: Class RK1, time delay.

D. Other Branch Circuits: Class RK1, time delay.

E. Control Circuits: Class CC, fast acting.

2.6 SEPARATELY-ENCLOSED CIRCUIT BREAKERS

A. Provide circuit breakers in accordance with the applicable requirements in Section 26 24 16, PANELBOARDS.

B. Enclosures shall be the NEMA types shown on the drawings. Where the types are not shown, they shall be the NEMA type most suitable for the ambient environmental conditions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

B. In seismic areas, enclosed switches and circuit breakers shall be adequately anchored and braced per details on structural contract drawings to withstand the seismic forces at the location where installed.

C. Fused switches shall be furnished complete with fuses. Arrange fuses such that rating information is readable without removing the fuses.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:
   a. Compare equipment nameplate data with specifications and approved shop drawings.
   b. Inspect physical, electrical, and mechanical condition.
   c. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method.
   d. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 SPARE PARTS

A. Two weeks prior to the final inspection, furnish one complete set of spare fuses for each fused disconnect switch installed on the project. Deliver the spare fuses to the COR.

---END---

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SECTION 26 43 13
SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of Type 2 Surge Protective Devices, as defined in NFPA 70, and indicated as SPD in this section.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 24 16, PANELBOARDS: For factory-installed or external SPD.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with drawings and specifications.
   b. Include electrical ratings and device nameplate data.
2. Manuals:
   a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.
   b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the SPD conforms to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the SPD has been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplement and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Institute of Engineering and Electronic Engineers (IEEE):

IEEE C62.41.2-02.....Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

IEEE C62.45-08.....Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits

C. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

D. Underwriters Laboratories, Inc. (UL):

UL 1283-15.....Electromagnetic Interference Filters

UL 1449-14.....Surge Protective Devices

PART 2 - PRODUCTS

2.1 PANELBOARD SPD

A. General Requirements:

1. Comply with UL 1449 and IEEE C62.41.2.
2. Modular design with field-replaceable modules, or non-modular design.
3. Fuses, rated at 200 kA interrupting capacity.
4. Bolted compression lugs for internal wiring.
5. Integral disconnect switch.
6. Redundant suppression circuits.
7. LED indicator lights for power and protection status.
8. Audible alarm, with silencing switch, to indicate when protection has failed.
9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
10. Four-digit transient-event counter.

B. Surge Current per Phase: Minimum 120kA per phase.

2.2 ENCLOSURES

A. Enclosures: NEMA 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

B. Factory-installed SPD: panelboard manufacturer shall install SPD at the factory.

C. Field-installed SPD: Contractor shall install SPD with conductors or buses between SPD and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

1. Provide a circuit breaker as a dedicated disconnecting means for TVSS as shown on drawings.

D. Do not perform insulation resistance tests on switchgear, switchboards, panelboards, or feeders with the SPD connected. Disconnect SPD before conducting insulation resistance tests and reconnect SPD immediately after insulation resistance tests are complete.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

a. Compare equipment nameplate data with specifications and approved shop drawings.

b. Inspect physical, electrical, and mechanical condition.

c. Verify that disconnecting means and feeder size and maximum length to SPD corresponds to approved shop drawings.

d. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.

e. Vacuum-clean enclosure interior. Clean enclosure exterior.

f. Verify the correct operation of all sensing devices, alarms, and indicating devices.

3.3 FOLLOW-UP VERIFICATION

A. After completion of acceptance checks and tests, the Contractor shall show by demonstration in service that SPD are in good operating condition and properly performing the intended function.

3.4 INSTRUCTION

A. Provide the services of a factory-trained technician for one 2-hour training period for instructing personnel in the maintenance and operation of the SPD, on the date requested by the COR.

---END---

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the furnishing, installation, and connection of the interior lighting systems. The terms "lighting fixture," "fixture," and "luminaire" are used interchangeably.

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION: Removal and disposal of lamps and ballasts.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirement for seismic restraint for nonstructural components.

C. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

D. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

F. Section 26 27 26, WIRING DEVICES: Wiring devices used for control of the lighting systems.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:

a. Submit the following information for each type of lighting fixture designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of lighting fixture designation.

b. Material and construction details, include information on housing and optics system.

c. Physical dimensions and description.

d. Wiring schematic and connection diagram.

e. Installation details.

f. Energy efficiency data.

g. Photometric data based on laboratory tests complying with IES Lighting Measurements testing and calculation guides.

h. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours), and color temperature (degrees Kelvin).

i. For LED lighting fixtures, submit US DOE LED Lighting Facts label, and IES L70 rated life

2. Manuals:

a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.

b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.

a. Certification by the Contractor that the interior lighting systems have been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):

C635/C635M REV A-13.....Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

C. Illuminating Engineering Society of North America (IESNA):

LM-79-08.....Electrical and Photometric Measurements of Solid-State Lighting Products

LM-80-15.....Measuring Lumen Maintenance of LED Light Sources

LM-82-12.....Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature

D. Institute of Electrical and Electronic Engineers (IEEE):

C62.41-91(R1995).....Surge Voltages in Low Voltage AC Power Circuits

E. International Code Council (ICC):

IBC-15.....International Building Code

F. National Electrical Manufacturer's Association (NEMA):

ng Systems

SSL 1-16.....Electronic Drivers for LED Devices, Arrays, or Systems

G. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

101-18.....Life Safety Code

H. Underwriters Laboratories, Inc. (UL):

496-17.....Lampholders

924-16.....Emergency Lighting and Power Equipment

Ballasts

1598-08.....Luminaires

750-15.....Light Emitting Diode (LED) Light Sources for Use in Lighting Products

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Shall be in accordance with NFPA, UL, as shown on drawings, and as specified.

B. Sheet Metal:

1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved), and parallel to each other as designed.
2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
3. When installed, any exposed fixture housing surface, trim frame, door frame, and lens frame shall be free of light leaks.
4. Hinged door frames shall operate smoothly without binding. Latches shall function easily by finger action without the use of tools.

C. lamps shall be serviceable while the fixture is in its normally installed position. .

D. Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.

E. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings and so forth) shall be retained in a secure manner by captive screws, chains, aircraft cable, captive hinges, or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

F. Metal Finishes:

1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion-resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking, and shall be applied after fabrication.
2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise shown on the drawing.
3. Exterior finishes shall be as shown on the drawings.

G. Lighting fixtures shall have a specific means for grounding metallic wireways and housings to an equipment grounding conductor.

H. Light Transmitting Components for LED Fixtures:

1. Shall be 100 percent virgin acrylic.
2. Flat lens panels shall have not less than 3 mm (1/8 inch) of average thickness.
3. Unless otherwise specified, lenses, reflectors, diffusers, and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction without distortion or cracking.

a flashing LED.

2.2 EMERGENCY LIGHTING UNIT

A. Complete, self-contained unit with batteries, battery charger, one or more local or remote lamp heads with lamps, under-voltage relay, and test switch.

1. Enclosure: Shall be impact-resistant thermoplastic or cast aluminum. Enclosure shall be suitable for the environmental conditions in which installed.
2. Lamp Heads: Horizontally and vertically adjustable, mounted on the face of the unit, except where otherwise indicated.
3. Lamps: Shall be sealed-beam MR-16 halogen, rated not less than 12 watts at the specified DC voltage.
4. Battery: Shall be maintenance-free nickel-cadmium. Minimum normal life shall be minimum of 10 years.
5. Battery Charger: Dry-type full-wave rectifier with charging rates to maintain the battery in fully-charged condition during normal operation, and to automatically recharge the battery within 12 hours following a 1-1/2 hour continuous discharge.
6. Integral Self-Test: Automatically initiates test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing LED.

2.3 LED EXIT LIGHT FIXTURES

A. Exit light fixtures shall meet applicable requirements of NFPA and UL.

B. Housing and door shall be die-cast aluminum.

C. For general purpose exit light fixtures, door frame shall be hinged, with latch. For vandal-resistant exit light fixtures, door frame shall be secured with tamper-resistant screws.

D. Finish shall be satin or fine-grain brushed aluminum.

E. There shall be no radioactive material used in the fixtures.

F. Fixtures:

1. Inscription panels shall be cast or stamped aluminum a minimum of 2.25 mm (0.090 inch) thick, stenciled with 150 mm (6 inch) high letters, baked with red color stable plastic or fiberglass. Lamps shall be luminous Light Emitting Diodes (LED) mounted in center of letters on red color stable plastic or fiberglass.
2. Double-Faced Fixtures: Provide double-faced fixtures where required or as shown on drawings.
3. Directional Arrows: Provide directional arrows as part of the inscription panel where required or as shown on drawings. Directional arrows shall be the "chevron-type" of similar size and width as the letters and meet the requirements of NFPA 101.

G. Voltage: Multi-voltage (120 – 277V).

2.4 LED LIGHT FIXTURES

A. General:

1. LED light fixtures shall be in accordance with IES, NFPA, UL, as shown on the drawings, and as specified.
2. LED light fixtures shall be Reduction of Hazardous Substances (RoHS)-compliant.
3. LED drivers shall include the following features unless otherwise indicated:
   a. Minimum efficiency: 85% at full load.
   b. Minimum Operating Ambient Temperature: -20˚ C. (-4˚ F.)
   c. Input Voltage: 120 - 277V (±10%) at 60 Hz.
   d. Integral short circuit, open circuit, and overload protection.
   e. Power Factor: ≥ 0.95.
   f. Total Harmonic Distortion: ≤ 20%.
   g. Comply with FCC 47 CFR Part 15.
4. LED modules shall include the following features unless otherwise indicated:
   a. Comply with IES LM-79 and LM-80 requirements.
   b. Minimum CRI 80 and color temperature 3000˚ K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
   c. Minimum Rated Life: 50,000 hours per IES L70.
   d. Light output lumens as indicated in the LIGHTING FIXTURE SCHEDULE.

B. LED Downlights:

1. Housing, LED driver, and LED module shall be products of the same manufacturer.

C. LED Troffers:

1. LED drivers, modules, and reflector shall be accessible, serviceable, and replaceable from below the ceiling.
2. Housing, LED driver, and LED module shall be products of the same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, manufacturer's instructions, and as shown on the drawings or specified.

B. Align, mount, and level the lighting fixtures uniformly.

C. Wall-mounted fixtures shall be attached to the studs in the walls, or to a 20 gauge metal backing plate that is attached to the studs in the walls. Lighting fixtures shall not be attached directly to gypsum board.

D. Lighting Fixture Supports:

1. Shall provide support for all of the fixtures. Supports shall be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
2. Shall maintain the fixture positions after cleaning and relamping.
3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
4. Hardware for recessed lighting fixtures:
   a. All fixture mounting devices connecting fixtures to the ceiling system or building structure shall have a capacity for a horizontal force of 100 percent of the fixture weight and a vertical force of 400 percent of the fixture weight.
   b. Mounting devices shall clamp the fixture to the ceiling system structure (main grid runners or fixture framing cross runners) at four points in such a manner as to resist spreading of these supporting members. Each support point device shall utilize a screw or approved hardware to "lock" the fixture housing to the ceiling system, restraining the fixture from movement in any direction relative to the ceiling. The screw (size No. 10 minimum) or approved hardware shall pass through the ceiling member (T-bar, channel or spline), or it may extend over the inside of the flange of the channel (or spline) that faces away from the fixture, in a manner that prevents any fixture movement.
   c. In addition to the above, the following is required for fixtures exceeding 9 kg (20 pounds) in weight.
      1) Where fixtures mounted in ASTM Standard C635 "Intermediate Duty" and "Heavy Duty" ceilings and weigh between 9 kg and 25 kg (20 pounds and 56 pounds), provide two 12 gauge safety hangers hung slack between diagonal corners of the fixture and the building structure.
      2) Where fixtures weigh over 25 kg (56 pounds), they shall be independently supported from the building structure by

approved hangers. Two-way angular bracing of hangers shall be provided to prevent lateral motion.

d. Where ceiling cross runners are installed for support of lighting fixtures, they shall have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.

5. Surface mounted lighting fixtures:

a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts (or stud-clips) shall be minimum 6 mm (1/4 inch) bolt, secured to main ceiling runners and/or secured to cross runners. Non-turning studs shall be attached to the main ceiling runners and cross runners with special non-friction clip devices designed for the purpose, provided they bolt through the runner, or are also secured to the building structure by 12 gauge safety hangers. Studs or bolts securing fixtures weighing in excess of 25 kg (56 pounds) shall be supported directly from the building structure.

b. Where ceiling cross runners are installed for support of lighting fixtures, they shall have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.

c. Fixtures less than 6.8 kg (15 pounds) in weight and occupying less than 3715 sq cm (two square feet) of ceiling area may, when designed for the purpose, be supported directly from the outlet box when all the following conditions are met.

1) Screws attaching the fixture to the outlet box pass through round holes (not key-hole slots) in the fixture body.

2) The outlet box is attached to a main ceiling runner (or cross runner) with approved hardware.

3) The outlet box is supported vertically from the building structure.

d. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.

6. Single or double pendant-mounted lighting fixtures:

a. Each stem shall be supported by an approved outlet box mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure.

7. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.

E. Furnish and install the new lamps as specified for all lighting fixtures installed under this project, and for all existing lighting fixtures reused under this project.

F. The electrical and ceiling trades shall coordinate to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges, and so forth), to match the ceiling system being installed.

G. Bond lighting fixtures to the grounding system as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

H. At completion of project, replace all defective components of the lighting fixtures at no cost to the Government.

I. Dispose of lamps per requirements of Section 02 41 00, DEMOLITION.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform the following:

1. Visual Inspection:

a. Verify proper operation by operating the lighting controls.

b. Visually inspect for damage to fixtures, lenses, reflectors, diffusers, and louvers. Clean fixtures, lenses, reflectors, diffusers, and louvers that have accumulated dust, dirt, or fingerprints during construction.

2. Electrical tests:

a. Exercise dimming components of the lighting fixtures over full range of dimming capability by operating the control devices(s) in the presence of the Contracting Officer Representative (COR). Observe for visually detectable flicker over full dimming range, and replace defective components at no cost to the Government.

b. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Government. Burn-in period to be 40 hours minimum, unless specifically recommended otherwise by the lamp manufacturer. Burn-in dimmed fluorescent and compact fluorescent lamps for at least 100 hours at full voltage, unless specifically recommended otherwise by the lamp manufacturer. Replace any lamps and ballasts which fail during burn-in.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the lighting systems are in good operating condition and properly performing the intended function.

---END---

SECTION 27 05 11
REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes common requirements to communications installations and applies to all sections of Division 27 and Division 28.

B. Provide completely functioning communications systems.

C. Comply with VAAR 852.236.91 and FAR clause 52.236-21 in circumstance of a need for additional detail or conflict between drawings, specifications, reference standards or code.

1.2 REFERENCES

A. Abbreviations and Acronyms

1. Refer to http://www.cfm.va.gov/til/sdetail.asp for Division 00, ARCHITECTURAL ABBREVIATIONS.

2. Additional Abbreviations and Acronyms:

A	Ampere
AC	Alternating Current
AE	Architect and Engineer
AFF	Above Finished Floor
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
AWG	American Wire Gauge (refer to STP and UTP)
AWS	Advanced Wireless Services
BCT	Bonding Conductor for Telecommunications (also Telecommunications Bonding Conductor (TBC))
BDA	Bi-Directional Amplifier
BICSI	Building Industry Consulting Service International
BIM	Building Information Modeling
BOM	Bill of Materials
BTU	British Thermal Units
BUCR	Back-up Computer Room
BTS	Base Transceiver Station
CAD	AutoCAD
CBOPC	Community Based Out Patient Clinic
CBC	Coupled Bonding Conductor
CBOC	Community Based Out Patient Clinic (refer to CBOPC, OPC, VAMC)
CCS	TIP's Cross Connection System (refer to VCCS and HCCS)
CFE	Contractor Furnished Equipment

CFM	US Department of Veterans Affairs Office of Construction and Facilities Management
CFR	Consolidated Federal Regulations
CIO	Communication Information Officer (Facility, VISN or Region)
cm	Centimeters
CO	Central Office
COR	Contracting Officer Representative
CPU	Central Processing Unit
CSU	Customer Service Unit
CUP	Conditional Use Permit(s) – Federal/GSA for VA
dB	Decibel
dBm	Decibel Measured
dBmV	Decibel per milli-Volt
DC	Direct Current
DEA	United States Drug Enforcement Administration
DSU	Data Service Unit
EBC	Equipment Bonding Conductor
ECC	Engineering Control Center (refer to DCR, EMCR)
EDGE	Enhanced Data (Rates) for GSM Evolution
EDM	Electrical Design Manual
EMCR	Emergency Management Control Room (refer to DCR, ECC)
EMI	Electromagnetic Interference (refer to RFI)
EMS	Emergency Medical Service
EMT	Electrical Metallic Tubing or thin wall conduit
ENTR	Utilities Entrance Location (refer to DEMARC, POTS, LEC)
EPBX	Electronic Digital Private Branch Exchange
ESR	Vendor’s Engineering Service Report
FA	Fire Alarm
FAR	Federal Acquisition Regulations in Chapter 1 of Title 48 of Code of Federal Regulations
FMS	VA’s Headquarters or Medical Center Facility’s Management Service
FR	Frequency (refer to RF)
FTS	Federal Telephone Service
GFE	Government Furnished Equipment
GPS	Global Positioning System
GRC	Galvanized Rigid Metal Conduit
GSM	Global System (Station) for Mobile
HCCS	TIP’s Horizontal Cross Connection System (refer to CCS & VCCS)
HDPE	High Density Polyethylene Conduit

HDTV	Advanced Television Standards Committee High-Definition Digital Television
HEC	Head End Cabinets (refer to HEIC, PA)
HEIC	Head End Interface Cabinets (refer to HEC, PA)
HF	High Frequency (Radio Band; Re FR, RF, VHF & UHF)
HSPA	High Speed Packet Access
HZ	Hertz
IBT	Intersystem Bonding Termination (NEC 250.94)
IC	Intercom
ICRA	Infectious Control Risk Assessment
IDEN	Integrated Digital Enhanced Network
IDC	Insulation Displacement Contact
IDF	Intermediate Distribution Frame
ILSM	Interim Life Safety Measures
IMC	Rigid Intermediate Steel Conduit
IRM	Department of Veterans Affairs Office of Information Resources Management
ISDN	Integrated Services Digital Network
ISM	Industrial, Scientific, Medical
IWS	Intra-Building Wireless System
LAN	Local Area Network
LBS	Location Based Services, Leased Based Systems
LEC	Local Exchange Carrier (refer to DEMARC, PBX & POTS)
LED	Light Emitting Diode
LMR	Land Mobile Radio
LTE	Long Term Evolution, or 4G Standard for Wireless Data Communications Technology
M	Meter
MAS	Medical Administration Service
MATV	Master Antenna Television
MCR	Main Computer Room
MCOR	Main Computer Operators Room
MDF	Main Distribution Frame
MH	Manholes or Maintenance Holes
MHz	Megahertz (10^6 Hz)
mm	Millimeter
MOU	Memorandum of Understanding
MW	Microwave (RF Band, Equipment or Services)
NID	Network Interface Device (refer to DEMARC)
NEC	National Electric Code
NOR	Network Operations Room
NRTL	OSHA Nationally Recognized Testing Laboratory
NS	Nurse Stations

NTIA	U.S. Department of Commerce National Telecommunications and Information Administration
OEM	Original Equipment Manufacturer
OI&T	Office of Information and Technology
OPC	VA's Outpatient Clinic (refer to CBOC, VAMC)
OSH	Department of Veterans Affairs Office of Occupational Safety and Health
OSHA	United States Department of Labor Occupational Safety and Health Administration
OTDR	Optical Time-Domain Reflectometer
PA	Public Address System (refer to HE, HEIC, RPEC)
PBX	Private Branch Exchange (refer to DEMARC, LEC, POTS)
PCR	Police Control Room (refer to SPCC, could be designated SCC)
PCS	Personal Communications Service (refer to UPCS)
PE	Professional Engineer
PM	Project Manager
PoE	Power over Ethernet
POTS	Plain Old Telephone Service (refer to DEMARC, LEC, PBX)
PSTN	Public Switched Telephone Network
PSRAS	Public Safety Radio Amplification Systems
PTS	Pay Telephone Station
PVC	Poly-Vinyl Chloride
PWR	Power (in Watts)
RAN	Radio Access Network
RBB	Rack Bonding Busbar
RF	Radio Frequency (refer to FR)
RFI	Radio Frequency Interference (refer to EMI)
RFID	RF Identification (Equipment, System or Personnel)
RMC	Rigid Metal Conduit
RMU	Rack Mounting Unit
RPEC	Radio Paging Equipment Cabinets (refer to HEC, HEIC, PA)
RTLS	Real Time Location Service or System
RUS	Rural Utilities Service
SCC	Security Control Console (refer to PCR, SPCC)
SMCS	Spectrum Management and Communications Security (COMSEC)
SFO	Solicitation for Offers
SME	Subject Matter Experts (refer to AHJ)
SMR	Specialized Mobile Radio
SMS	Security Management System
SNMP	Simple Network Management Protocol
SPCC	Security Police Control Center (refer to PCR, SMS)
STP	Shielded Balanced Twisted Pair (refer to UTP)

STR	Stacked Telecommunications Room
TAC	VA's Technology Acquisition Center, Austin, Texas
TCO	Telecommunications Outlet
TER	Telephone Equipment Room
TGB	Telecommunications Grounding Busbar (also Secondary Bonding Busbar (SBB))
TIP	Telecommunications Infrastructure Plant
TMGB	Telecommunications Main Grounding Busbar (also Primary Bonding Busbar (PBB))
TMS	Traffic Management System
TOR	Telephone Operators Room
TP	Balanced Twisted Pair (refer to STP and UTP)
TR	Telecommunications Room (refer to STR)
TWP	Twisted Pair
UHF	Ultra-High Frequency (Radio)
UMTS	Universal Mobile Telecommunications System
UPCS	Unlicensed Personal Communications Service (refer to PCS)
UPS	Uninterruptible Power Supply
USC	United States Code
UTP	Unshielded Balanced Twisted Pair (refer to TP and STP)
UV	Ultraviolet
V	Volts
VAAR	Veterans Affairs Acquisition Regulation
VACO	Veterans Affairs Central Office
VAMC	VA Medical Center (refer to CBOC, OPC, VACO)
VCCS	TIP's Vertical Cross Connection System (refer to CCS and HCCS)
VHF	Very High Frequency (Radio)
VISN	Veterans Integrated Services Network (refers to geographical region)
VSWR	Voltage Standing Wave Radio
W	Watts
WEB	World Electronic Broadcast
WiMAX	Worldwide Interoperability (for MW Access)
WI-FI	Wireless Fidelity
WMTS	Wireless Medical Telemetry Service
WSP	Wireless Service Providers

B. Definitions:

1. Bond: Permanent joining of metallic parts to form an electrically conductive path to ensure electrical continuity and capacity to safely conduct any currents likely to be imposed to earth ground.
2. Conduit: Includes all raceway types specified.
3. Conveniently Accessible: Capable of being reached without use of ladders, or without climbing or crawling under or over obstacles such as, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.
4. System: Specific hardware, firmware, and software, functioning together as a unit, performing task for which it was designed.
5. Telecommunications Bonding Backbone (TBB): Conductors of appropriate size (minimum 53.49 mm2 [1/0 AWG]) stranded copper wire, that connect to Grounding Electrode System and route to telecommunications main grounding busbar (TMGB) and circulate to interconnect various TGBs and other locations shown on drawings.

1.3 APPLICABLE PUBLICATIONS

A. Applicability of Standards: Unless documents include more stringent requirements, applicable construction industry standards have same force and effect as if bound or copied directly into the documents to extent referenced. Such standards are made a part of these documents by reference.
   1. Each entity engaged in construction shall be familiar with industry standards applicable to its construction activity.
   2. Obtain standards directly from publication source, where copies of standards are needed to perform a required construction activity.

B. Government Codes, Standards and Executive Orders: Refer to http://www.cfm.va.gov/TIL/cPro.asp:
   1. Federal Communications Commission, (FCC) CFR, Title 47:

Part 15.....	Restrictions of use for Part 15 listed RF Equipment in Safety of Life Emergency Functions and Equipment Locations
Part 47.....	Chapter A, Paragraphs 6.1-6.23, Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment
Part 58.....	Television Broadcast Service
Part 73.....	Radio and Television Broadcast Rules
Part 90.....	Rules and Regulations, Appendix C

Form 854.....Antenna Structure Registration

Chapter XXIII .....National Telecommunications and Information Administration (NTIA, P/O Commerce, Chapter XXIII) the 'Red Book'– Chapters 7, 8 & 9 compliments CFR, Title 47, FCC Part 15, RF Restriction of Use and Compliance in "Safety of Life" Functions & Locations

2. US Department of Agriculture, (Title 7, USC, Chapter 55, Sections 2201, 2202 & 2203:

RUS 1755.....Telecommunications Standards and Specifications for Materials, Equipment and Construction:

RUS Bull 1751F-630...Design of Aerial Cable Plants

RUS Bull 1751F-640...Design of Buried Cable Plant, Physical Considerations

RUS Bull 1751F-643...Underground Plant Design

RUS Bull 1751F-815...Electrical Protection of Outside Plants,

RUS Bull 1753F-201...Acceptance Tests of Telecommunications Plants (PC-4)

RUS Bull 1753F-401...Splicing Copper and Fiber Optic Cables (PC-2)

RUS Bull 345-50.....Trunk Carrier Systems (PE-60)

RUS Bull 345-65 .....Shield Bonding Connectors (PE-65)

RUS Bull 345-72 .....Filled Splice Closures (PE-74)

RUS Bull 345-83 .....Gas Tube Surge Arrestors (PE-80)

3. US Department of Commerce/National Institute of Standards Technology(NIST):

FIPS PUB 1-1.....Telecommunications Information Exchange

FIPS PUB 100/1.....Interface between Data Terminal Equipment (DTE) Circuit Terminating Equipment for operation with Packet Switched Networks, or Between Two DTEs, by Dedicated Circuit

FIPS PUB 140/2.....Telecommunications Information Security Algorithms

FIPS PUB 143 .....General Purpose 37 Position Interface between DTE and Data Circuit Terminating Equipment

FIPS 160/2.....Electronic Data Interchange (EDI),

FIPS 175.....Federal Building Standard for Telecommunications Pathway and Spaces

FIPS 191.....Guideline for the Analysis of Local Area Network Security

FIPS 197.....Advanced Encryption Standard (AES)

FIPS 199.....Standards for Security Categorization of Federal Information and Information Systems

4. US Department of Defense, (DoD):

MIL-STD-188-110.....Interoperability and Performance Standards for Data Modems

MIL-STD-188-114.....Electrical Characteristics of Digital Interface Circuits

MIL-STD-188-115.....Communications Timing and Synchronizations Subsystems

MIL-C-28883.....Advanced Narrowband Digital Voice Terminals

MIL-C-39012/21.....Connectors, Receptacle, Electrical, Coaxial, Radio Frequency, (Series BNC (Uncabled), Socket Contact, Jam Nut Mounted, Class 2)

5. US Department of Health and Human Services:

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) Privacy, Security and Breach Notification Rules

6. US Department of Justice:

2010 Americans with Disabilities Act Standards for Accessible Design (ADAAD).

7. US Department of Labor, (DoL) - Public Law 426-62 – CFR, Title 29, Part 1910, Chapter XVII - Occupational Safety and Health Administration (OSHA), Occupational Safety and Health Standards):

Subpart 7 .....Approved NRTLs; obtain a copy at http://www.osha.gov/dts/otpca/nrtl/faq nrtl.html)

Subpart 35.....Compliance with NFPA 101, Life Safety Code

Subpart 36.....Design and Construction Requirements for Exit Routes

Subpart 268.....Telecommunications

Subpart 305.....Wiring Methods, Components, and Equipment for General Use

Subpart 508 .....Americans with Disabilities Act Accessibility Guidelines; technical requirement for accessibility to buildings and facilities by individuals with disabilities

8. US Department of Transportation, (DoT):
    a. Public Law 85-625, CFR, Title 49, Part 1, Subpart C – Federal Aviation Administration (FAA):AC 110/460-ID & AC 707 / 460-2E – Advisory Circulars Standards for Construction of Antenna Towers, and 7450 and 7460-2 – Antenna Construction Registration Forms.
9. US Department of Veterans Affairs (VA): Office of Telecommunications (OI&T), MP-6, PART VIII, TELECOMMUNICATIONS, CHAPTER 5, AUDIO, RADIO AND TELEVISION (and COMSEC) COMMUNICATIONS SYSTEMS: Spectrum Management and COMSEC Service (SMCS), AHJ for:
    a. CoG, "Continuance of Government" communications guidelines and compliance.
    b. COMSEC, "VA wide coordination and control of security classified communication assets."
    c. COOP, "Continuance of Operations" emergency communications guidelines and compliance.
    d. FAA, FCC, and US Department of Commerce National Telecommunications and Information Administration, "VA wide RF Co-ordination, Compliance and Licensing."
    e. Handbook 6100 – Telecommunications: Cyber and Information Security Office of Cyber and Information Security, and Handbook 6500 – Information Security Program.
    f. Low Voltage Special Communications Systems "Design, Engineering, Construction Contract Specifications and Drawings Conformity, Proof of Performance Testing, VA Compliance and Life Safety Certifications for CFM and VA Facility Low Voltage Special Communications Projects (except Fire Alarm, Telephone and Data Systems)."
    g. SATCOM, "Satellite Communications" guidelines and compliance, and Security and Law Enforcement Systems – "Coordinates the Design, Engineering, Construction Contract Specifications and Drawings Conformity, Proof of Performance Testing, VA Compliance, DEA and Public Safety Certification(s) for CFM and VA Facility Security Low Voltage Special Communications and Physical Security Projects.
    h. VHA's National Center for Patient Safety – Veterans Health Administration (VHA) Warning System, Failure of Medical Alarm

Systems using Paging Technology to Notify Clinical Staff, July 2004.

i. VA's CEOSH, concurrence with warning identified in VA Directive 7700.

j. Wireless and Handheld Devices, "Guidelines and Compliance,"

k. Office of Security and Law Enforcement: VA Directive 0730 and Health Special Presidential Directive (HSPD)-12.

C. NRTL Standards: Refer to https://www.osha.gov/dts/otpca/nrtl/index.html

1. Canadian Standards Association (CSA); same tests as presented by UL
2. Communications Certifications Laboratory (CEL); same tests as presented by UL.
3. Intertek Testing Services NA, Inc., (ITSNA), formerly Edison Testing Laboratory (ETL) same tests as presented by UL).
4. Underwriters Laboratory (UL):

1-2005.....Flexible Metal Conduit
5-2011.....Surface Metal Raceway and Fittings
6-2007.....Rigid Metal Conduit
44-010 .....Thermoset-Insulated Wires and Cables
50-1995.....Enclosures for Electrical Equipment
65-2010.....Wired Cabinets
83-2008.....Thermoplastic-Insulated Wires and Cables
96-2005.....Lightning Protection Components
96A-2007.....Installation Requirements for Lightning Protection Systems
360-2013.....Liquid-Tight Flexible Steel Conduit
444-2008.....Communications Cables
467-2013.....Grounding and Bonding Equipment
486A-486B-2013.....Wire Connectors
486C-2013.....Splicing Wire Connectors
486D-2005.....Sealed Wire Connector Systems
486E-2009.....Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-2007.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable
497/497A/497B/497C
497D/497E.....Protectors for Paired Conductors/Communications Circuits/Data Communications and Fire Alarm

Circuits/coaxial circuits/voltage protections/Antenna Lead In

510-2005.....Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape

514A-2013.....Metallic Outlet Boxes

514B-2012.....Fittings for Cable and Conduit

514C-1996.....Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers

651-2011.....Schedule 40 and 80 Rigid PVC Conduit

651A-2011.....Type EB and A Rigid PVC Conduit and HDPE Conduit

797-2007.....Electrical Metallic Tubing

884-2011.....Underfloor Raceways and Fittings

1069-2007.....Hospital Signaling and Nurse Call Equipment

1242-2006.....Intermediate Metal Conduit

1449-2006.....Standard for Transient Voltage Surge Suppressors

1479-2003.....Fire Tests of Through-Penetration Fire Stops

1480-2003.....Speaker Standards for Fire Alarm, Emergency, Commercial and Professional use

1666-2007.....Standard for Wire/Cable Vertical (Riser) Tray Flame Tests

1685-2007.....Vertical Tray Fire Protection and Smoke Release Test for Electrical and Fiber Optic Cables

1861-2012.....Communication Circuit Accessories

1863-2013.....Standard for Safety, communications Circuits Accessories

1865-2007.....Standard for Safety for Vertical-Tray Fire Protection and Smoke-Release Test for Electrical and Optical-Fiber Cables

2024-2011.....Standard for Optical Fiber Raceways

2024-2014.....Standard for Cable Routing Assemblies and Communications Raceways

2196-2001.....Standard for Test of Fire Resistive Cable

60950-1 ed. 2-2014...Information Technology Equipment Safety

D. Industry Standards:

1. Advanced Television Systems Committee (ATSC):

A/53 Part 1: 2013....ATSC Digital Television Standard, Part 1, Digital Television System

A/53 Part 2: 2011....ATSC Digital Television Standard, Part 2, RF/Transmission System Characteristics

A/53 Part 3: 2013....ATSC Digital Television Standard, Part 3, Service Multiplex and Transport System Characteristics

A/53 Part 4: 2009....ATSC Digital Television Standard, Part 4, MPEG-2 Video System Characteristics

A/53 Part 5: 2014....ATSC Digital Television Standard, Part 5, AC-3 Audio System Characteristics

A/53 Part 6: 2014....ATSC digital Television Standard, Part 6, Enhanced AC-3 Audio System Characteristics

2. American Institute of Architects (AIA): 2006 Guidelines for Design & Construction of Health Care Facilities.

3. American Society of Mechanical Engineers (ASME):

A17.1 (2016).....Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices

17.3 (2011).....Safety Code for Existing Elevators and Escalators

17.4 (2009).....Guide for Emergency Personnel

17.5 (2011).....Elevator and Escalator Electrical Equipment

4. American Society for Testing and Materials (ASTM):

B1 (2001).....Standard Specification for Hard-Drawn Copper Wire

B8 (2004).....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

D1557 (2012).....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft3 (2,700 kN-m/m3)

D2301 (2004).....Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape

B258-02 (2008).....Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors

D709-01(2007).....Standard Specification for Laminated Thermosetting Materials

D4566 (2008).....Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable

5. American Telephone and Telegraph Corporation (AT&T) - Obtain following AT&T Publications at https://ebiznet.sbc.com/SBCNEBS/):

ATT-TP-76200 (2013)..Network Equipment and Power Grounding, Environmental, and Physical Design Requirements

ATT-TP-76300(2012)...Merged AT&T Affiliate Companies Installation Requirements

ATT-TP-76305 (2013)..Common Systems Cable and Wire Installation and Removal Requirements - Cable Racks and Raceways

ATT-TP-76306 (2009)..Electrostatic Discharge Control

ATT-TP-76400 (2012)..Detail Engineering Requirements

ATT-TP-76402 (2013)..AT&T Raised Access Floor Engineering and Installation Requirements

ATT-TP-76405 (2011)..Technical Requirements for Supplemental Cooling Systems in Network Equipment Environments

ATT-TP-76416 (2011)..Grounding and Bonding Requirements for Network Facilities

ATT-TP-76440 (2005)..Ethernet Specification

ATT-TP-76450 (2013)..Common Systems Equipment Interconnection Standards for AT&T Network Equipment Spaces

ATT-TP-76461 (2008)..Fiber Optic Cleaning

ATT-TP-76900 (2010)..AT&T Installation Testing Requirement

ATT-TP-76911 (1999)..AT&T LEC Technical Publication Notice

6. British Standards Institution (BSI):

BS EN 50109-2.....Hand Crimping Tools - Tools for The Crimp Termination of Electric Cables and Wires for Low Frequency and Radio Frequency Applications – All Parts & Sections. October 1997

7. Building Industry Consulting Service International(BICSI):

ANSI/BICSI 013-2014..Telecommunications Distribution Method manual

ANSI/BICSI 002-2011..Data Center Design and Implementation Best Practices

ANSI/BICSI 004-2012..Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities

ANSI/NECA/BICSI 568-2006.....Standard for Installing Commercial Building Telecommunications Cabling

NECA/BICSI 607-2011..Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

ANSI/BICSI 005-2013 .Electronic Safety and Security (ESS) System Design and Implementation Best Practices

8. Electronic Components Assemblies and Materials Association, (ECA).

ECA EIA/RS-270 (1973) Tools, Crimping, Solderless Wiring Devices – Recommended Procedures for User Certification

EIA/ECA 310-E (2005).Cabinets, and Associated Equipment

9. Facility Guidelines Institute: 2010 Guidelines for Design and Construction of Health Care Facilities.

10. Insulated Cable Engineers Association (ICEA):

ANSI/ICEA S-80-576-2002.....Category 1 & 2 Individually Unshielded Twisted-Pair Indoor Cables for Use in Communications Wiring Systems

ANSI/ICEA S-84-608-2010.....Telecommunications Cable, Filled Polyolefin Insulated Copper Conductor, S-87-640(2011) Optical Fiber Outside Plant Communications Cable

ANSI/ICEA S-90-661-2012.....Category 3, 5, & 5e Individually Unshielded Twisted-Pair Indoor Cable for Use in General Purpose and LAN Communication Wiring Systems

S-98-688 (2012).....Broadband Twisted Pair Cable Aircore, Polyolefin Insulated, Copper Conductors

S-99-689 (2012).....Broadband Twisted Pair Cable Filled, Polyolefin Insulated, Copper Conductors

ICEA S-102-700 (2004).....Category 6 Individually Unshielded Twisted Pair Indoor Cables (With or Without an Overall Shield) for use in Communications Wiring Systems Technical Requirements

11. Institute of Electrical and Electronics Engineers (IEEE):

ISSN 0739-5175 .....March-April 2008 Engineering in Medicine and Biology Magazine, IEEE (Volume: 27, Issue:2) Medical Grade-Mission Critical-Wireless Networks

IEEE C2-2012.....National Electrical Safety Code (NESC)

C62.41.2-2002/ Cor 1-2012 IEEE .....Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits 4)

C62.45-2002.....IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits

81-2012 IEEE.....Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System

100-1992.....IEEE the New IEEE Standards Dictionary of Electrical and Electronics Terms

602-2007.....IEEE Recommended Practice for Electric Systems in Health Care Facilities

1100-2005.....IEEE Recommended Practice for Powering and Grounding Electronic Equipment

12. International Code Council:

AC193 (2014).....Mechanical Anchors in Concrete Elements

13. International Organization for Standardization (ISO):

ISO/TR 21730 (2007)..Use of Mobile Wireless Communication and Computing Technology in Healthcare Facilities - Recommendations for Electromagnetic Compatibility (Management of Unintentional

Electromagnetic Interference) with Medical Devices

14. National Electrical Manufacturers Association (NEMA):

NEMA 250 (2008).....Enclosures for Electrical Equipment (1,000V Maximum)

ANSI C62.61 (1993)...American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits

ANSI/NEMA FB 1 (2012) ...Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing EMT) and Cable

ANSI/NEMA OS 1 (2009) ...Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports

NEMA SB 19 (R2007)...NEMA Installation Guide for Nurse Call Systems

TC 3 (2004).....Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

NEMA VE 2 (2006).....Cable Tray Installation Guidelines

15. National Fire Protection Association (NFPA):

70E-2018.....Standard for Electrical Safety in the Workplace

70-2020.....National Electrical Code (NEC)

72-2019.....National Fire Alarm Code

75-2017.....Standard for the Fire Protection of Information Technological Equipment

76-2016.....Recommended Practice for the Fire Protection of Telecommunications Facilities

77-2019.....Recommended Practice on Static Electricity

90A-2018.....Standard for the Installation of Air Conditioning and Ventilating Systems

99-2018.....Health Care Facilities Code

101-2018.....Life Safety Code

241-2019.....Safeguarding construction, alternation and Demolition Operations

255-2009.....Standard Method of Test of Surface Burning Characteristics of Building Materials

262 - 2019.....Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces

780-2017.....Standard for the Installation of Lightning Protection Systems

1221-2019.....Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems

5000-2018.....Building Construction and Safety Code

16. Society for Protective Coatings (SSPC):

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

17. Society of Cable Telecommunications Engineers (SCTE):

ANSI/SCTE 15 2006 ...Specification for Trunk, Feeder and Distribution Coaxial Cable

18. Telecommunications Industry Association (TIA):

TIA-120 Series.....Telecommunications Land Mobile communications (APCO/Project 25) (January 2014)

TIA TSB-140.....Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems (2004)

TIA-155.....Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T (2010)

TIA TSB-162-A.....Telecommunications Cabling Guidelines for Wireless Access Points (2013)

TIA-222-G.....Structural Standard for Antenna Supporting Structures and Antennas (2014)

TIA/EIA-423-B.....Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits (2012)

TIA-455-C.....General Requirements for Standard Test Procedures for Optical Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and other Fiber Optic Components (August 2014)

TIA-455-53-A.....FOTP-53 Attenuation by Substitution Measurements for Multimode Graded-Index Optical Fibers in Fiber Assemblies (Long Length) (September 2001)

TIA-455-61-A.....FOTP-61 Measurement of Fiber of Cable Attenuation Using an OTDR (July 2003)

TIA-472D000-B.....Fiber Optic Communications Cable for Outside Plant Use (July 2007)

ANSI/TIA-492-B .....62.5-µ Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers (November 2009)

ANSI/TIA-492AAAB-A ..50-um Core Diameter/125-um Cladding Diameter Class IA Graded-Index Multimode Optically Optimized American Standard Fibers (November 2009

TIA-492CAAA.....Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers (September 2002)

TIA-492E000.....Sectional Specification for Class IVd Nonzero-Dispersion Single-Mode Optical Fibers for the 1,550 nm Window (September 2002)

TIA-526-7-B.....Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7 (December 2008)

TIA-526.14-A.....Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – SFSTP-14 (August 1998)

TIA 526-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant

TIA-568.....Revision/Edition: C Commercial Building Telecommunications Cabling Standard Set: (TIA-568-C.0-2 Generic Telecommunications Cabling for Customer Premises (2012), TIA-568-C.1-1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements (2012), TIA-568-C.2 Commercial Building Telecommunications Cabling Standard—Part 2: Balanced Twisted Pair Cabling Components (2009), TIA-568-C.3-1 Optical Fiber Cabling Components Standard, (2011) AND TIA-568-C.4 Broadband Coaxial Cabling and Components Standard (2011) with addendums and erratas

TIA-569.....Revision/Edition C Telecommunications Pathways and Spaces (March 2013)

TIA-574.....Position Non-Synchronous Interface between Data Terminal equipment and Data Circuit Terminating Equipment Employing Serial Binary Interchange (May 2003)

TIA/EIA-590-A.....Standard for Physical Location and Protection of Below Ground Fiber Optic Cable Plant (July 2001)

TIA-598-D.....Optical Fiber Cable Color Coding (January 2005)

TIA-604-10-B.....Fiber Optic Connector Intermateablility Standard (August 2008)

ANSI/TIA-606-B.....Administration Standard for Telecommunications Infrastructure (2012)

ANSI/TIA-606-A1.....Administration Standard for Telecommunications Infrastructure Addendum 1

TIA-607-B.....Generic Telecommunications Bonding and Grounding (Earthing) For Customer Premises (January 2013)

TIA-613.....High Speed Serial Interface for Data Terminal Equipment and Data Circuit Terminal Equipment (September 2005)

ANSI/TIA-758-B.....Customer-owned Outside Plant Telecommunications Infrastructure Standard (April 2012)

ANSI/TIA-854.....A Full Duplex Ethernet Specification for 1000 Mb/s (1000BASE-TX) Operating over Category 6 Balanced Twisted-Pair Cabling (2001)

ANSI/TIA-862-A.....Building Automation Systems Cabling Standard (April 2011)

TIA-942-A.....Telecommunications Infrastructure Standard for Data Centers (March 2014)

TIA-1152.....Requirements for Field Testing Instruments and Measurements for Balanced Twisted Pair Cabling (September 2009)

TIA-1179.....Healthcare Facility Telecommunications Infrastructure Standard (July 2010)

1.4 SINGULAR NUMBER

A. Where any device or part of equipment is referred in singular number (such as " rack"), reference applies to as many such devices as are required to complete installation.

1.5 RELATED WORK

A. Specification Order of Precedence: FAR Clause 52.236-21, VAAR Clause 852.236-71.

1. Field Cutting and Patching: Section 09 91 00, PAINTING.
2. Additional submittal requirements: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
3. Availability and source of references and standards specified in applicable publications: Section 01 42 19, REFERENCE STANDARDS.
4. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction: Section 07 84 00, FIRESTOPPING.
5. Sealant and caulking materials and their application: Section 07 92 00, JOINT SEALANTS.
6. General electrical requirements that are common to more than one section of Division 26: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
7. Electrical conductors and cables in electrical systems rated 600 V and below: Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
8. Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents: Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
9. Conduit and boxes: Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
10. Wiring devices: Section 26 27 26, WIRING DEVICES.
11. General requirements common to more than one section in Division 28: Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.
12. Conductors and cables for electronic safety and security systems: Section 28 05 13, CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY.

13. Low impedance path to ground for electronic safety and security system ground fault currents: Section 28 05 26, GROUNDING AND BONDING FOR SECURITY SYSTEMS.
14. Conduits and partitioned telecommunications raceways for Electronic Safety and Security systems: Section 28 05 28.33, CONDUITS AND BACK BOXES FOR ELECTRONIC SAFETY AND SECURITY.
15. Alarm initiating devices, alarm notification appliances, control units, fire safety control devices, annunciators, power supplies, and wiring: Section 28 31 00, FIRE DETECTION AND ALARM.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Assign a single communications project manager to serve as point of contact for Government, contractor, and design professional.

B. Be proactive in scheduling work.
   1. Use of premises is restricted at times directed by COR.
   2. Movement of materials: Unload materials and equipment delivered to site.
   3. Coordinate installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
   4. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of Work.
   5. Coordinate connection of materials, equipment, and systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies; provide required connection for each service.
   6. Initiate and maintain discussion regarding schedule for ceiling construction and install cables to meet that schedule.

C. Contact the Office of Telecommunications, Special Communications Team (005OP2H3) (202)461-5310 to have a Government-accepted Telecommunications COR assigned to project for telecommunications review, equipment and system approval and coordination with other VA personnel.

D. Communications Project Manager Responsibilities:
   1. Assume responsibility for overall telecommunications system integration and coordination of work among trades, subcontractors, and authorized system installers.

2. Coordinate with related work indicated on drawings or specified.
3. Manage work related to telecommunications system installation in a manner approved by manufacturer.

1.7 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Provide parts list including quantity of spare parts.

C. Provide manufacturer product information. Government reserves the right to require a list of installations where products have been in operation.

D. Provide coordination drawings for all systems/equipment/devices, coordinate with all other trades, sections of corridor mechanical, plumbing, electrical, cable tray drawings shall be submitted for approval.

E. Provide Source Quality Control Submittal:
   1. Submit written certification from OEM indicating that proposed supervisor of installation and proposed provider of warranty maintenance are authorized representatives of OEM. Include individual's legal name, contact information and OEM credentials in certification.
   2. Submit written certification from OEM that wiring and connection diagrams meet Government Life Safety Guidelines, NFPA, NEC, NRTL, these specifications, and Joint Commission requirements and instructions, requirements, recommendations, and guidance set forth by OEM for the proper performance of system.
   3. Pre-acceptance Certification: Certification in accordance with procedure outlined in Section 01 00 00, GENERAL REQUIREMENTS and specific Division 27 qualification documentation.

F. Installer Qualifications: Submit three installations of similar size and complexity furnished and installed by installer; include:
   1. Installation location and name.
   2. Owner’s name and contact information including, address, telephone and email.
   3. Date of project start and date of final acceptance.
   4. System project number.
   5. Three-paragraph description of each system related to this project; include function, operation, and installation.

G. Provide delegated design submittals (e.g. seismic support design).

H. Submittals are required for all equipment anchors and supports. Include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or conduit. Anchors and supports to resist seismic load based on seismic design categories per section 4.0 of VA seismic design requirements H-18-8 dated August, 2013.

I. Test Equipment List:

1. Supply test equipment of accuracy better than parameters to be tested.
2. Submit test equipment list including make and model number:
   a. ANSI/TIA-1152 CAT 6A class EA twisted pair cabling test instrument.
   b. Fiber optic insertion loss power meter with light source.
   c. Optical time domain reflectometer (OTDR).
   d. Volt-Ohm meter.
   e. Digital camera.
3. Supply only test equipment with a calibration tag from Government-accepted calibration service dated not more than 12 months prior to test.
4. Provide sample test and evaluation reports.

J. Submittal Drawings:

1. Telecommunications Space Plans/Elevations: Provide enlarged floor plans of telecommunication spaces indicating layout of equipment and devices, including receptacles and grounding provisions. Submit detailed plan views and elevations of telecommunication spaces showing racks, termination blocks, and cable paths. Include following rooms:
   a. Telecommunications rooms.
2. Logical Drawings: Provide logical riser or schematic drawings for all systems.
   a. Provide riser diagrams systems and interconnection drawings for equipment assemblies; show termination points and identify wiring connections.
3. Access Panel Schedule on Submittal Drawings: Coordinate and prepare a location, size, and function schedule of access panels required to fully service equipment.

K. Furnish electronic certified test reports to COR prior to final inspection and not more than 90 days after completion of tests.

1.8 CLOSEOUT SUBMITTALS

A. Provide following closeout submittals prior to project closeout date:
   1. Warranty certificate.
   2. Evidence of compliance with requirements such as low voltage certificate of inspection.
   3. Project record documents.
   4. Instruction manuals and software that are a part of system.

B. Maintenance and Operation Manuals: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
   1. Prepare a manual for each system and equipment specified.
   2. Furnish on portable storage drive in PDF format or equivalent accepted by COR.
   3. Furnish complete manual as specified in specification section, fifteen days prior to performance of systems or equipment test.
   4. Furnish remaining manuals prior to final completion.
   5. Identify storage drive "MAINTENANCE AND OPERATION MANUAL" and system name.
   6. Include name, contact information and emergency service numbers of each subcontractor installing system or equipment and local representatives for system or equipment.
   7. Provide a Table of Contents and assemble files to conform to Table of Contents.
   8. Operation and Maintenance Data includes:
      a. Approved shop drawing for each item of equipment.
      b. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of equipment.
      c. A control sequence describing start-up, operation, and shutdown.
      d. Description of function of each principal item of equipment.
      e. Installation and maintenance instructions.
      f. Safety precautions.
      g. Diagrams and illustrations.
      h. Test Results and testing methods.
      i. Performance data.
      j. Pictorial "exploded" parts list with part numbers. Emphasis to be placed on use of special tools and instruments. Indicate sources

of supply, recommended spare parts, and name of servicing organization.

k. Warranty documentation indicating end date and equipment protected under warranty.

l. Appendix; list qualified permanent servicing organizations for support of equipment, including addresses and certified personnel qualifications.

C. Record Wiring Diagrams:

1. Red Line Drawings: Keep one E size 91.44 cm x 121.92 cm (36 inches x 48 inches) set of floor plans, on site during work hours, showing installation progress marked and backbone cable labels noted. Make these drawings available for examination during construction meetings or field inspections.
2. General Drawing Specifications: Detail and elevation drawings to be D size 61 cm x 91.44 cm (24 inches x 36 inches) with a minimum scale of 0.635 cm = 30.48 cm (1/4 inch = 12 inches). ER, TR and other enlarged detail floor plan drawings to be D size 61 cm x 91.44 cm (24” x 36”) with a minimum scale of 0.635 cm = 30.48 cm (1/4 inch = 12 inches). Building composite floor plan drawings to be D size 61 cm x 91.44 cm (24 inches x 36 inches) with a minimum scale of 3.175 mm = 30.48 cm (1/8 inch = 1’ 0 inch).
3. Building Composite Floor Plans: Provide building floor plans showing work area outlet locations and configuration, types of jacks, distance for each cable, and cable routing locations.
4. Floor plans to include:
   a. Final room numbers and actual backbone cabling and pathway locations and labeling.
   b. Inputs and outputs of equipment identified according to labels installed on cables and equipment
   c. Device locations with labels.
   d. Conduit.
   e. Head-end equipment.
   f. Wiring diagram.
   g. Labeling and administration documentation.
5. Submit Record Wiring Diagrams within five business days after final cable testing.

6. Deliver Record Wiring Diagrams as CAD files in .dwg or .dgn OR .rvt formats as determined by COR.
7. Deliver four complete sets of electronic record wiring diagrams to COR on portable storage drive.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. After approval and prior to installation, furnish COR with the following:
   1. A 300 mm (12 inch) length of each type and size of wire and cable along with tag from coils of reels from which samples were taken.
   2. One coupling, bushing and termination fitting for each type of conduit.
   3. Samples of each hanger, clamp and supports for conduit and pathways.
   4. Duct sealing compound.

1.10 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer shall produce, as a principal product, the equipment and material specified for this project, and have manufactured item for at least three years.
B. Product and System Qualification:
   1. OEM shall have three installations of equipment submitted presently in operation of similar size and type as this project, that have continuously operated for a minimum of three years.
   2. Government reserves the right to require a list of installations where products have been in operation before approval.
   3. Authorized representative of OEM shall be responsible for design, satisfactory operation of installed system, and certification.
C. Trade Contractor Qualifications: Trade contractor shall have completed three or more installations of similar systems of comparable size and complexity with regards to coordinating, engineering, testing, certifying, supervising, training, and documentation. Identify these installations as a part of submittal.
D. System Supplier Qualifications: System supplier shall be authorized by OEM to warranty installed equipment.
E. Telecommunications technicians assigned to system shall be trained, and certified by OEM on installation and testing of system; provide written evidence of current OEM certifications for installers.
F. Manufactured Products:
   1. Comply with FAR clause 52.236-5 for material and workmanship.

2. When more than one unit of same class of equipment is required, units shall be product of a single manufacturer.
3. Equipment Assemblies and Components:
   a. Components of an assembled unit need not be products of same manufacturer.
   b. Manufacturers of equipment assemblies, which include components made by others, to assume complete responsibility for final assembled unit.
   c. Provide compatible components for assembly and intended service.
   d. Constituent parts which are similar shall be a product of a single manufacturer.
4. Identify factory wiring on equipment being furnished and on wiring diagrams.

G. Testing Agencies: Government reserves the option of witnessing factory tests. Notify COR minimum 15 working days prior to manufacturer performing the factory tests.
1. When equipment fails to meet factory test and re-inspection is required, contractor is liable for additional expenses, including expenses of Government.

H. Contractor Qualification:
1. The Contractor or sub-contractor shall be a licensed Contractor with a minimum of three (3) years' experience installing and servicing systems of similar scope and complexity. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as the proposed system. The references shall be include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system manufacturer certification for all technicians. The technicians shall have a minimum of five (5) continuous years of technical experience in cabling and terminations

of low voltage equipment. The Contractor shall have a local service facility. The facility shall be located within 60 miles of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The Contracting Officer of Record (COR) reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.

2. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
3. Cable installer shall have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide consistent oversight of the project cabling throughout design, layout, installation, termination and testing.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Government's approval of submittals shall be obtained for equipment and material before delivery to job site.
   2. Deliver and store materials to job site in OEM's original unopened containers, clearly labeled with OEM's name and equipment catalog numbers, model and serial identification numbers for COR to inventory cable, patch panels, and related equipment.

B. Storage and Handling Requirements:
   1. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:
      a. Store and protect equipment in a manner that precludes damage or loss, including theft.
      b. Protect painted surfaces with factory installed removable heavy kraft paper, sheet vinyl or equivalent.
      c. Protect enclosures, equipment, controls, controllers, circuit protective devices, and other like items, against entry of foreign matter during installation; vacuum clean both inside and outside before testing and operating.

1.12 FIELD CONDITIONS

A. Where variations from documents are requested in accordance with GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, connecting work and related components shall include additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

B. A contract adjustment or additional time shall not be granted because of field conditions pursuant to FAR 52.236-2 and FAR 52.236-3; a contract adjustment or additional time shall not be granted for additional work required for complete and usable construction and systems pursuant to FAR 52.246-12.

1.13 WARRANTY

A. Comply with FAR clause 52.246-21., except as follows:

1. Warranty material and equipment to be free from defects, workmanship, and remain so for a period of one year for Emergency Systems from date of final acceptance of system by Government; provide OEM’s equipment warranty document to COR.
2. Government maintenance personnel shall have ability to contact OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time; contractor and OEM shall provide this capability.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide communications spaces and pathways conforming to TIA 569, at a minimum.

2.2 EQUIPMENT IDENTIFICATION

A. Provide laminated black phenolic resin, with a white core, nameplates with minimum 6 mm (1/4 inch) high engraved lettering.

B. Nameplates furnished by manufacturer as standard catalog items, unless other method of identification is indicated.

2.3 WIRE LUBRICATING COMPOUND

A. Provide non-hardening or forming adhesive coating cable lubricants suitable for cable jacket material and raceway.

2.4 FIREPROOFING TAPE

A. Provide flexible, conformable fabric tape of organic composition and coated one side with flame-retardant elastomer.

B. Tape shall be self-extinguishing and cannot support combustion; arc-proof and fireproof.

C. Tape cannot deteriorate when subjected to water, gases, salt water, sewage, or fungus; and tape shall be resistant to sunlight and ultraviolet light.

D. Application shall withstand a 200-ampere arc for minimum 30 seconds.

E. Securing Tape: Glass cloth electrical tape minimum 0.18 mm (7 mils) thick and 19 mm (3/4 inch) wide.

PART 3 - EXECUTION

3.1 PREPARATION

A. Penetrations and Sleeves:

1. Lay out penetration and sleeve openings in advance, to permit provision in work.
2. Set sleeves in forms before concrete is poured.
3. Set sleeves prior to installation of structure for passage of pipes, conduit, ducts
4. Provide sleeves and packing materials at penetrations of foundations, walls, slabs, partitions, and floors.
5. Make sleeves that penetrate outside walls, basement slabs, footings, and beams waterproof.
6. Fill slots, sleeves and other openings in floors or walls if not used.
   a. Fill spaces in openings after installation of conduit or cable.
   b. Provide fill for floor penetrations to prevent passage of water, smoke, fire, and fumes.
   c. Provide fire resistant fill in rated floors and walls, to prevent passage of air, smoke and fumes.
7. Install sleeves through floors watertight and extend minimum 50.8 mm (2 inches) above floor surface.
8. Match and set sleeves flush with adjoining floor, ceiling, and wall finishes where raceways passing through openings are exposed in finished rooms.
9. Annular space between conduit and sleeve shall be minimum 6 mm (1/4 inch).
10. Do not provide sleeves for slabs-on-grade, unless specified or indicated otherwise.

11. Comply with requirements for firestopping, for sleeves through rated fire walls and smoke partitions.
12. Do not support piping risers or conduit on sleeves.
13. Identify unused sleeves and slots for future installation.
14. Provide core drilling if walls are poured or otherwise constructed without sleeves and wall penetration is required; do not penetrate structural members.

B. Core Drilling:
1. Avoid core drilling whenever possible.
2. Coordinate openings with other trades and utilities, to prevent damage to structural reinforcement.
3. Investigate existing conditions in vicinity of required opening prior to coring, including an x-ray of floor if determined necessary by competent person or COR.
4. Protect areas from damage.

C. Verification of In-Place Conditions:
1. Verify location, use and status of all material, equipment, and utilities that are specified, indicated, or determined necessary for removal.
   a. Verify materials, equipment, and utilities to be removed are inactive, not required, or in use after completion of project.
   b. Replace with equivalent any material, equipment and utilities that were removed by contractor that are required to be left in place.
2. Existing Utilities: Do not interrupt utilities serving facilities occupied by Government or others unless permitted under following conditions and then only after arranging to provide temporary utility services, according to requirements indicated:
   a. Notify COR in writing at least 14 days in advance of proposed utility interruptions.
   b. Do not proceed with utility interruptions without Government’s written permission.

D. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs for floor, wall and ceiling mounting of equipment as required.

E. Provide steel supports and hardware for installation of hangers, anchors, guides, and other support hardware.

F. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly that would void warranty.

3.2 INSTALLATION - GENERAL

A. Coordinate systems, equipment, and materials installation with other building components.

B. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings.

C. Conform to VAAR 852.236.91 arrangements indicated, recognizing that work may be shown in diagrammatic form or have been impracticable to detail all items because of variances in manufacturers' methods of achieving specified results.

D. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed in both exposed and un-exposed spaces.

E. Install equipment according to manufacturers' written instructions.

F. Install wiring and cabling between equipment and related devices.

G. Install cabling, wiring, and equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum interference of adjacent other installations.

H. Provide access panel or doors where units are concealed behind finished surfaces.

I. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for wiring, cabling, and equipment installations.

J. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom and access for service and maintenance as possible.

K. Install systems, materials, and equipment giving priority to systems required to be installed at a specified slope.

L. Avoid interference with structure and with work or other trades, preserving adequate headroom and clearing doors and passageways to satisfaction of COR and code requirements.

M. Install equipment and cabling to distribute equipment loads on building structural members provided for equipment support under other sections;

install and support roof-mounted equipment on structural steel or roof curbs as appropriate.

N. Provide supplementary or miscellaneous items, appurtenances, devices and materials for a complete installation.

3.3 EQUIPMENT INSTALLATION

A. Locate equipment as close as practical to locations shown on drawings.

B. Note locations of equipment requiring access on record drawings.

C. Access and Access Panels: Verify access panel locations and construction with COR.

D. Inaccessible Equipment:

1. Where Government determines that contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed and without additional cost to Government.

3.4 EQUIPMENT IDENTIFICATION

A. Install an identification sign which clearly indicates information required for use and maintenance of equipment.

B. Secure identification signs with screws.

3.5 CUTTING AND PATCHING

A. Perform cutting and patching according to contract general requirements and as follows:

1. Remove samples of installed work as specified for testing.
2. Remove and replace defective work.
3. Remove and replace non-conforming work.

B. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.

C. Protect adjacent installations during cutting and patching operations.

D. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Patch finished surfaces and building components using new materials specified for original installation and experienced installers.

3.6 FIELD QUALITY CONTROL

A. Provide work according to VAAR 852.236.91 and FAR clause 52.236-5.

B. Provide minimum clearances and work required for compliance with NFPA 70, National Electrical Code (NEC), and manufacturers' instructions; comply with additional requirements indicated for access and clearances.

C. Verify all field conditions and dimensions that affect selection and provision of materials and equipment, and provide any disassembly, reassembly, relocation, demolition, cutting and patching required to provide work specified or indicated, including relocation and reinstallation of existing wiring and equipment.
   1. Protect facility, equipment, and wiring from damage.
D. Submit written notice that:
   1. Project has been inspected for compliance with documents.
   2. Work has been completed in accordance with documents.
E. Non-Conforming Work: Conduct project acceptance inspections, final completion inspections, substantial completion inspections, and acceptance testing and demonstrations after verification of system operation and completeness by Contractor.
F. For project acceptance inspections, final completion inspections, substantial completion inspections, and testing/demonstrations that require more than one site visit by COR or design professional to verify project compliance for same material or equipment, Government reserves right to obtain compensation from contractor to defray cost of additional site visits that result from project construction or testing deficiencies and incompleteness, incorrect information, or non-compliance with project provisions.
   1. COR shall notify contractor, of hourly rates and travel expenses for additional site visits, and shall issue an invoice to Contractor for additional site visits.
   2. Contractor is not eligible for extensions of project schedule or additional charges resulting from additional site visits that result from project construction or testing deficiencies/incompleteness, incorrect information, or non-compliance with Project provisions.
G. Tests:
   1. Interim inspection is required at approximately 50 percent of installation.
   2. Request inspection ten working days prior to interim inspection start date by notifying COR in writing; this inspection shall verify equipment and system being provided adheres to installation, mechanical and technical requirements of construction documents.

3. Inspection to be conducted by OEM and factory-certified contractor representative, and witnessed by COR, facility and SMCS 0050P2H3 representatives.
4. Check each item of installed equipment to ensure appropriate NRTL listing labels and markings are fixed in place.
5. Visually confirm minimum Category 6A cable marking at TCOs, CCSs locations, patch cords and origination locations.
6. Review entire communications circulating ground system, each TGB and grounding connection, grounding electrode and outside lightning protection system.
7. Review cable tray, conduit and path/wire way installation practice.
8. OEM and contractor to perform:
   a. Fiber optical cable field inspection tests via attenuation measurements on factory reels; provide results along with OEM certification for factory reel tests.
9. Relocate failed cable reels to a secured location for inventory, as directed by COR, and then remove from project site within two working days; provide COR with written confirmation of defective cable reels removal from project site.
10. Provide results of interim inspections to COR.
11. If major or multiple deficiencies are discovered, additional interim inspections could be required until deficiencies are corrected, before permitting further system installation.
    a. Additional inspections are scheduled at direction of COR.
    b. Re-inspection of deficiencies noted during interim inspections, shall be part of system’s Final Acceptance Proof of Performance Test.
    c. The interim inspection cannot affect the system’s completion date unless directed by COR.
12. Facility COR shall ensure test documents become a part of system’s official documentation package.

H. Proof of Performance Certification:
1. If system is declared acceptable, AHJ (SMCS 005OP2H3) provides COR notice stating system processes to required operating standards and functions and is Government accepted for use by facility.
2. Validate items with COR needing to be provided to complete project contract (i.e. charts & diagrams, manuals, spare parts, system

warranty documents executed. Once items have been provided, COR contacts FMS service chief to turn over system from CFM oversight for beneficial use by facility.

3. If system is declared unacceptable without conditions, rescheduled testing expenses shall be borne by contractor.

3.7 CLEANING

A. Remove debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from project site and clean work area, prior to final inspection and acceptance of work.

B. Put building and premises in neat and clean condition.

C. Remove debris on a daily basis.

D. Remove unused material, during progress of work.

E. Perform cleaning and washing required to provide acceptable appearance and operation of equipment to satisfaction of COR.

F. Clean exterior surface of all equipment, including concrete residue, dirt, and paint residue, after completion of project.

G. Perform final cleaning prior to project acceptance by COR.

H. Remove paint splatters and other spots, dirt, and debris; touch up scratches and mars of finish to match original finish.

I. Clean devices internally using methods and materials recommended by manufacturer.

J. Tighten wiring connectors, terminals, bus joints, and mountings, to include lugs, screws and bolts according to equipment manufacturer’s published torque tightening values for equipment connectors. In absence of published connection or terminal torque values, comply with torque values specified in UL 486A-486B.

3.8 TRAINING

A. Provide training in accordance with subsection, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.

B. Provide training for equipment or system as required in each associated specification.

C. Develop and submit training schedule for approval by COR, at least 30 days prior to planned training.

3.9 PROTECTION

A. Protection of Fireproofing:

1. Install clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed, if possible, prior to start of spray fireproofing work.
2. Install conduits and other items that would interfere with proper application of fireproofing after completion of spray fire proofing work.
3. Patch and repair fireproofing damaged due to cutting or course of work shall be performed by installer of fireproofing and paid for by trade responsible for damage.

B. Maintain equipment and systems until final acceptance.
Ensure adequate protection of equipment and material during installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions.

3.10 COLOR CHART

A. All voice, video, and data cables and connectors to have the following colors:

Description Item	Jack	Cable	**Patch Cables**	I.D.	Notes
Telephone	Ivory	Ivory	Ivory	T	4 PR Cable
Data/Computer	Blue	Blue	Blue	C	4 PR Cable
CCTV – IP	White	White	White	CCTV	4 PR cable

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SECTION 27 05 33
RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies conduit, fittings, and boxes to form complete, coordinated, raceway systems. Raceways are required for communications cabling unless shown or specified otherwise.

1.2 RELATED WORK

A. Mounting board for Telecommunication Rooms: Section 06 10 00, ROUGH CARPENTRY.

B. Sealing around penetrations to maintain integrity of fire rated construction: Section 07 84 00, FIRESTOPPING.

C. Identification and painting of conduit and other devices: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. In accordance with Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS, submit the following:

1. Size and location of cabinets, splice boxes and pull boxes.
2. Layout of required conduit penetrations through structural elements.
3. Catalog cuts marked with specific item proposed and area of application identified.
4. Provide coordination drawings, coordinate with mechanical, plumbing, sprinkler and electrical contractors.

B. Certification: Provide letter prior to final inspection, certifying material is in accordance with construction documents and properly installed.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Minimum Conduit Size: 32 mm (1 1/4 inch).

B. Conduit:

1. Rigid Galvanized Steel: Conform to UL 6, ANSI C80.1.
2. Rigid Intermediate Steel Conduit (IMC): Conform to UL 1242, ANSI C80.6.
3. Electrical Metallic Tubing (EMT):
   a. Maximum Size: 105 mm (4 inches).
   b. Install only for cable rated 600 volts or less.

c. Conform to UL 797, ANSI C80.3.

4. Flexible Galvanized Steel Conduit: Conform to UL 1.
5. Liquid-tight Flexible Metal Conduit: Conform to UL 360.
6. Surface Metal Raceway: Conform to UL 5.

C. Conduit Fittings:

1. Rigid Galvanized Steel and Rigid Intermediate Steel Conduit Fittings:
   a. Provide fittings meeting requirements of UL 514B and ANSI/ NEMA FB 1.
   b. Sealing: Provide threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water and vapor. In concealed work, install sealing fittings in flush steel boxes with blank cover plates having same finishes as other electrical plates in room.
   c. Standard Threaded Couplings, Locknuts, Bushings, and Elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
   d. Locknuts: Bonding type with sharp edges for digging into metal wall of an enclosure.
   e. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into metallic body of fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
   f. Erickson (union-type) and Set Screw Type Couplings:
      1) Couplings listed for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete.
      2) Use set screws of case-hardened steel with hex head and cup point to seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
   g. Provide OEM approved fittings.
2. Electrical Metallic Tubing Fittings:
   a. Conform to UL 514B and ANSI/ NEMA FB1; only steel or malleable iron materials are acceptable.
   b. Couplings and Connectors: Concrete tight and rain tight, with connectors having insulated throats.
      1) Use gland and ring compression type couplings and connectors for conduit sizes 50 mm (2 inches) and smaller.

2) Use set screw type couplings with four set screws each for conduit sizes over 50 mm (2 inches).
3) Use set screws of case-hardened steel with hex head and cup point to seat in wall of conduit for positive grounding.

c. Indent type connectors or couplings are not permitted.
d. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are not permitted.
e. Provide OEM approved fittings.

3. Flexible Steel Conduit Fittings:
a. Conform to UL 514B; only steel or malleable iron materials are acceptable.
b. Provide clamp type, with insulated throat.
c. Provide OEM approved fittings.

4. Liquid-tight Flexible Metal Conduit Fittings:
a. Conform to UL 514B and ANSI/ NEMA FB1; only steel or malleable iron materials are acceptable.
b. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening.
c. Provide connectors with insulated throats to prevent damage to cable jacket.
d. Provide OEM approved fittings.

5. Expansion and Deflection Couplings:
a. Conform to UL 467 and UL 514B.
b. Accommodate 19 mm (3/4 inch) deflection, expansion, or contraction in any direction, and allow 30-degree angular deflections.
c. Include internal flexible metal braid sized to ensure conduit ground continuity and fault currents in accordance with UL 467, and NEC code tables for ground conductors.
d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

6. Wireway Fittings: As recommended by wireway OEM.

D. Conduit Supports:
1. Parts and Hardware: Provide zinc-coat or equivalent corrosion protection.

2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple Conduit (Trapeze) Hangers: Minimum 38 mm by 38 mm (1-1/2 by 1-1/2 inch), 2.78 mm (12 gage) steel, cold formed, lipped channels; with minimum 9 mm (3/8 inch) diameter steel hanger rods.
4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Splice, and Pull Boxes:
1. Conform to UL-50 and UL-514A.
2. Cast metal where required by NEC or shown and equipped with rustproof boxes.
3. Sheet Metal Boxes: Galvanized steel, except where otherwise shown.
4. Install flush mounted wall or ceiling boxes with raised covers so that front face of raised cover is flush with wall.
5. Install surface mounted wall or ceiling boxes with surface style flat or raised covers.
6. All communications outlets shall be 4-11/16 inch boxes with a minimum of 2-1/2-inch-deep with single or two gang 3/4 mud ring as shown on the drawings.

F. Wireways: Equip with hinged covers, except where removable covers are shown.

G. Outlet Boxes:
1. Flush wall mounted minimum 11.9 cm (4-11/16 inches) square, 9.2 cm (3-5/8 inches) deep pressed galvanized steel with single or double gang ¾ mud ring.
2. Flush wall mounted 12.7 cm (5 inches) square x 7.3 cm (2-7/8 inches); deep pressed galvanized steel.
3. 2-Gang Tile Box:
   a. Flush backbox type for installation in block walls.
   b. Minimum 92 mm (3-5/8 inches) deep.

H. Weatherproof Outlet Boxes: Surface mount two gang, 67 mm (2-5/8 inches) deep weatherproof cast aluminum with powder coated finish internal threads on hubs 19 mm (3/4 inch) minimum.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Raceways typically required for cabling systems unless otherwise indicated:

System	Specification Section	Installed Method
Control, Communication and Signal Wiring	27 10 00	Complete Conduit
Communications Structured Cabling	27 15 00	Complete Conduit
Physical Access Control System	28 13 00	Complete Conduit
Video Surveillance	28 23 00	Complete Conduit
Fire Detection and Alarm	28 31 00	Complete Conduit

B. Penetrations:

1. Cutting or Holes:

a. Locate holes in advance of installation. Where they are proposed in structural sections, obtain approval of structural engineer and COR prior to drilling through structural sections.

b. Make holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not permitted; COR may grant limited permission by request, in condition of limited working space.

c. Fire Stop: Where conduits, wireways, and other communications raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

1) Fill and seal clearances between raceways and openings with fire stop material.

2) Install only retrofittable, non-hardening, and reusable firestop material that can be removed and reinstalled to seal around cables inside conduits.

d. Waterproofing at Floor, Exterior Wall, and Roof Conduit Penetrations:

C. Conduit Installation:

1. Minimum conduit size of 32 mm (1 1/4 inch), but not less than size required for 40 percent fill.
2. Install insulated bushings on all conduit ends.
3. Extend vertical conduits/sleeves through floors minimum 75 mm (3 inches) above floor and minimum 75 mm (3 inches) below ceiling of floor below.
4. Terminate conduit runs to and from a backboard in a closet or interstitial space at top or bottom of backboard. Install conduits to enter telecommunication rooms next to wall and flush with backboard.
5. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections.
6. Seal empty conduits located in telecommunications rooms or on backboards with a standard non-hardening putty compound to prevent entrance of moisture and gases and to meet fire resistance requirements.
7. Minimum radius of communication conduit bends:

Sizes of Conduit Trade Size	Radius of Conduit Bends mm, Inches
1-1/4	350 (14)
1-1/2	430 (17)
2	525 (21)
2-1/2	635 (25)
3	775 (31)
3-1/2	900 (36)
4	1125 (45)

8. Provide 19 mm (3/4 inch) thick fire retardant plywood specified in Section 06 10 00, ROUGH CARPENTRY on wall of communication closets where shown on drawings. Mount plywood with bottom edge 300 mm (12 inches) above finished floor and top edge 2.74 m (9 feet) A.F.F.
9. Provide pull wire in all empty conduits; sleeves through floor are exceptions.
10. Complete each entire conduit run installation before pulling in cables.
11. Flattened, dented, or deformed conduit is not permitted.
12. Ensure conduit installation does not encroach into ceiling height head room, walkways, or doorways.

13. Cut conduit square with a hacksaw, ream, remove burrs, and draw tight.
14. Install conduit mechanically continuous and in straight run parallel with the corridor.
15. Install pull boxes after every 180 degrees of bends (two 90-degree bends). Size boxes per TIA 569. Support box with ¼ inch rod.
16. Independently support conduit at 2.44 m (8 feet) on center; do not use other supports (i.e., suspended ceilings, suspended ceiling supporting members, luminaires, conduits, mechanical piping, or mechanical ducts).
17. Support conduit within 300 mm (1 foot) of changes of direction, and within 300 mm (1 foot) of each enclosure to which connected.
18. Close ends of empty conduit with plugs or caps to prevent entry of debris, until cables are pulled in.
19. Conduit shall be supported within 150 mm (6 inches) of the cable tray.
20. Attach conduits to cabinets, splice cases, pull boxes and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on inside of enclosure, made up wrench tight. Do not make conduit connections to box covers.
21. Do not use aluminum conduits in wet locations.
22. Unless otherwise indicated on drawings or specified herein, conceal conduits within finished walls, floors and ceilings.
23. Conduit Bends:
    a. Make bends with standard conduit bending machines; observe minimum bend radius for cable type and outside diameter.
    b. Conduit hickey is permitted only for slight offsets, and for straightening stubbed conduits.
    c. Bending of conduits with a pipe tee or vise is not permitted.
24. Layout and Homeruns - Deviations: Make only where necessary to avoid interferences and only after drawings showing proposed deviations have been submitted and approved by COR.

D. Concealed Work Installation:

E. Furred or Suspended Ceilings and in Walls:

1. Rigid steel, IMC. Different type conduits mixed indiscriminately in same system is not permitted.
2. Align and run conduit parallel or perpendicular to building lines.

3. Tightening set screws with pliers is not permitted.

F. Exposed Work Installation:

1. Unless otherwise indicated on drawings, exposed conduit is only permitted in telecommunications rooms.
   a. Provide rigid steel, IMC..
   b. Different type of conduits mixed indiscriminately in system is not permitted.
2. Align and run conduit parallel or perpendicular to building lines.
3. Install horizontal runs close to ceiling or beams and secure with conduit straps.
4. Support horizontal or vertical runs at not over 2400 mm (96 inches) intervals.
5. Surface Metal Raceways: Use only where shown on drawings.
6. Painting:
   a. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
   b. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color.
   c. Provide labels where conduits pass through walls and floors and at maximum 6000 mm (20 foot) intervals in between.

G. Each Conduit shall be labeled (Stenciled every 20 feet) with the following information for each system as follows:

1. Orange: Demarcation Point
2. Green: Network Connection.
3. Purple: Common equipment.
4. White: First Level, Terminating building backbone, MC (CD) to IC (BD)
5. Gray: Second level, IC(BD) to TR(HD)/FD)
6. Blue: Horizontal Cabling.
7. Brown: Campus Backbone.
8. Yellow: Misc, security, PACS, CATV, MATV, Nurse call.
9. Red: Fire Alarm.

H. Expansion Joints:

1. Conduits 75 mm (3 inches) and larger, that are secured to building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install couplings in accordance with manufacturer's recommendations.

2. Provide conduits smaller than 75 mm (3 inches) with pull boxes on both sides of expansion joint. Connect conduits to expansion and deflection couplings as specified.
3. Install expansion and deflection couplings where shown.

I. Conduit Supports, Installation:

1. Select AC193 code listed mechanical anchors or fastening devices with safe working load not to exceed 1/4 of proof test load.
2. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 2.5 m (8 foot) on center.
3. Support multiple conduit runs with trapeze hangers. Use trapeze hangers designed to support a load equal or greater than sum of the weights of the conduits, wires, hanger itself, and 90 kg (200 pounds). Attach each conduit with U-bolts or other accepted fasteners.
4. Support conduit independent of pull boxes, luminaires, suspended ceiling components, angle supports, duct work, and similar items.
5. Fastenings and Supports in Solid Masonry and Concrete:
   a. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing concrete.
   b. Existing Construction:
      1) Code AC193 listed wedge type steel expansion anchors minimum 6 mm (1/4 inch) bolt size and minimum 28 mm (1-1/8 inch) embedment.
      2) Power set fasteners minimum 6 mm (1/4 inch) diameter with depth of penetration minimum 75 mm (3 inches).
      3) Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
6. Fastening to Hollow Masonry: Toggle bolts are permitted.
7. Fastening to Metal Structures: Use machine screw fasteners or other devices designed and accepted for application.
8. Bolts supported only by plaster or gypsum wallboard are not acceptable.
9. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
10. Do not support conduit from chain, wire, or perforated strap.

11. Spring steel type supports or fasteners are not permitted except horizontal and vertical supports/fasteners within walls.
12. Vertical Supports:
    a. Install riser clamps and supports for vertical conduit runs in accordance with NEC.
    b. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

J. Box Installation:
1. Boxes for Concealed Conduits:
    a. Flush mounted.
    b. Provide raised covers for boxes to suit wall or ceiling, construction and finish.
2. In addition to boxes shown, install additional boxes where needed to prevent damage to cables during pulling.
3. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
4. Stencil or install phenolic nameplates on covers of boxes identified on riser diagrams; for example "SIG-FA JB No. 1".
5. Outlet boxes mounted back-to-back in same wall are not permitted. A minimum 600 mm (24 inches) center-to-center lateral spacing must be maintained between boxes.

K. Flexible Nonmetallic Communications Raceway (Innerduct), Installation:
1. Install supports from building structure for horizontal runs at intervals not to exceed 900 mm (3 feet) and at each end.
2. Install supports from building structure for vertical runs at intervals not to exceed 1.2 m (4 feet) and at each side of joints.
3. Install only in accessible spaces not subject to physical damage or corrosive influences.
4. Make bends manually to assure internal diameter of tubing is not effectively reduced.
5. Extend each segment of innerduct minimum 300 mm (12 inches) beyond end of service conduit tie or cable tray. Restrain innerduct ends with wall mount clamps and seal when cable is installed.

3.2 EXISTING CONDUITS

A. Existing conduit can be used for new work.

B. If existing conduit is going to be used for new cables, the contractor shall clean the conduit from mud and dirt, pull all unused cables before the new cables are pulled/installed.

C. Contractor shall provide protection for the new cable while pulling it in the existing conduit.

D. Perform simple continuity test after cable installation.

3.3 TESTING

A. Examine fittings and locknuts for secureness.

B. Test RMC, IMC and EMT systems for electrical continuity.

C. Perform simple continuity test after cable installation.

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SECTION 27 10 00
CONTROL, COMMUNICATION AND SIGNAL WIRING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes control, communication and signal wiring for a comprehensive systems infrastructure.

B. This section applies to all sections of Divisions 27 and 28.

1.2 RELATED WORK

A. Sealing around penetrations to maintain integrity of time rated construction: Section 07 84 00, FIRESTOPPING.

B. General electrical requirements that are common to more than one section in Division 27: Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

C. Conduits for cables and wiring: Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.

1.3 SUBMITTALS

A. Submit in accordance with Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

B. Submit written certification from OEM:

1. Indicate wiring and connection diagrams meet National and Government Life Safety Guidelines, NFPA, NEC, NRTL, Joint Commission, OEM, this section and Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
2. Include instructions, requirements, recommendations, and guidance for proper performance of system as described herein.
3. Government shall not approve any submittal without this certification.

C. Identify environmental specifications on technical submittals; identify requirements for installation.

1. Minimum floor space and ceiling heights.
2. Minimum size of doors for cable reel passage.

D. Closeout Submittals:

1. Provide contact information for maintenance personnel to contact contractor for emergency maintenance and logistic assistance, and assistance in resolving technical problems at any time during warranty period.
2. Provide certified OEM sweep test tags from each cable reel to COR.

3. Furnish spare or unused wire and cable with appropriate connectors (female types) for installation in appropriate punch blocks, barrier strips, patch, or bulkhead connector panels.
4. Turn over unused and opened installation kit boxes, coaxial, fiber optic, and twisted pair cable reels, conduit, cable tray, cable duct bundles, wire rolls, physical installation hardware to COR.
5. Documentation: Include any item or quantity of items, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to completely and correctly provide system documentation required herein.

PART 2 - PRODUCTS

2.1 CONTROL WIRING

A. Provide control wiring large enough so voltage drop under in-rush conditions does not adversely affect operation of controls.
B. Provide cable meeting specifications for type of cable.
C. Outside Location (i.e. above ground, underground in conduit, ducts, pathways. Provide cables filled with a waterproofing compound between outside jacket (not touching any provided armor) and inter conductors to seal punctures in jacket and protect conductors from moisture.
D. Remote Control Cable:
   1. Multi-conductor with stranded conductors able to handle power and voltage required to control specified system equipment, from a remote location.
   2. NRTL listed and pass VW-1 vertical wire flame test (UL 83) (formerly FR-1).
   3. Color-coded Conductors: Combined multi-conductor and coaxial cables are acceptable for this installation, on condition system performance standards are met.
   4. Technical Characteristics:
      a. Length: As required, in 1K (3,000 ft.) reels minimum.
      b. Connectors: As required by system design.
      c. Size:
         1) 18 AWG, minimum, Outside.
         2) 20 AWG, minimum, Inside.
      d. Color Coding: Required, EIA industry standard.
      e. Bend Radius: 10 times cable outside diameter.

f. Impedance: As required.

g. Shield Coverage: As required by OEM specification.

h. Attenuation:

Frequency in MHz	dB per 305 Meter (1,000 feet), maximum
0.7	5.2
1.0	6.5
4.0	14.0
8.0	19.0
16.0	26.0
20.0	29.0
25.0	33.0
31.0	36.0
50.0	52.0

E. Distribution System Signal Wires and Cables:

1. Provide in same manner, and use construction practices, as Fire Protective and other Emergency Systems identified and defined in NFPA 101, Life Safety Code, Chapters 7, 12, and 13, NFPA 70, National Electrical Code, Chapter 7, Special Conditions.
2. Provide system able to withstand adverse environmental conditions without deterioration, in their respective location.
3. Provide entering of each equipment enclosure, console, cabinet or rack in such a manner that all doors or access panels can be opened and closed without removal or disruption of cables.
4. Terminate on an item of equipment by direct connection.

2.2 COMMUNICATION AND SIGNAL WIRING

A. Provide communications and signal wiring conforming to recommendations of manufacturers of systems; provide not less than TIA Performance Category 6A.

B. Wiring shown is for typical systems; provide wiring as required for systems being provided.

C. Provide color-coded conductor insulation for multi-conductor cables.

D. Connectors:

1. Provide connectors for transmission lines, and signal extensions to maintain uninterrupted continuity, ensure effective connection, and preserve uniform polarity between all points in system.

a. Provide AC barrier strips with a protective cover to prevent accidental contact with wires carrying live AC current.
b. Provide punch blocks for signal connection, not AC power. AC power twist-on wire connectors are not permitted for signal wire terminations.

2. Cables: Provide connectors designed for specific size cable and conductors being installed with OEM's approved installation tool. Typical system cable connectors include:
   a. Audio spade lug.
   b. Punch block.
   c. Wirewrap.

2.3 EXISTING WIRING

A. Reuse existing wiring, only where indicated on plans and accepted by SMCS 005OP2H3.

B. Only existing wiring that conforms to specifications and applicable codes can be reused; existing wiring that does not meet these requirements cannot be reused and must be removed by contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install wiring in cable tray or raceway.
   2. Seal cable entering a building from underground, between wire and conduit where cable exits conduit, with non-hardening approved compound.
   3. Wire Pulling:
      a. Provide installation equipment that prevents cutting or abrasion of insulation during pulling of cables.
      b. Use ropes made of nonmetallic material for pulling feeders.
      c. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached to conductors, as accepted by COR.
      d. Pull multiple cables into a single conduit together.

B. Control, Communication and Signal Wiring Installation:
   1. Unless otherwise specified in other sections, provide wiring and connect to equipment/devices to perform required functions as indicated.

2. Install separate cables for each system so that malfunctions in any system does not affect other systems, except where otherwise required.
3. Group wires and cables according to service (i.e. AC, grounds, signal, DC, and control.) DC, control and signal cables can be included with any group.
4. Form wires and cables to not change position in group throughout the conduit run. Bundle wires and cables in accepted signal duct, conduit, cable ducts, or cable trays neatly formed, tied off in 600 mm to 900 mm (24 inch to 36 inch) lengths to not change position in group throughout run.
5. Concealed splices are not allowed.
6. Separate, organize, bundle, and route wires or cables to restrict EMI, channel crosstalk, or feedback oscillation inside any enclosure.
7. Looking at any enclosure from the rear (wall mounted enclosures, junction, pull or interface boxes from the front), locate AC power, DC and speaker wires or cables on the left; coaxial, control, microphone and line level audio and data wires or cables, on the right.
8. Provide ties and fasteners that do not damage or distort wires or cables. Limit spacing between tied points to maximum 150 mm (6 inches).
9. Install wires or cables outside of buildings in conduit, secured to solid building structures.
10. Wires or cables must be specifically accepted, on a case by case basis, to be installed outside of conduit. Bundled wires or cables shall be tied at minimum 460 mm (18 inches) intervals to a solid building structure; bundled wires or cables shall have ultra violet protection and be waterproof (including all connections).
11. Laying wires or cables directly on roof tops, ladders, drooping down walls, walkways, floors is not permitted.
12. Wires or cables installed outside of conduit, cable trays, wireways, cable duct.
    a. Only when authorized, can wires or cables be identified and approved to be installed outside of conduit.

b. Provide wire or cable rated plenum and OEM certified for use in air plenums.
c. Provide wires and cables hidden, protected, fastened and tied at maximum 600 mm (24 inches) intervals, to building structure.
d. Provide closer wire or cable fastening intervals to prevent sagging, maintain clearance above suspended ceilings.
e. Remove unsightly wiring and cabling from view, and discourage tampering and vandalism.
f. Sleeve and seal wire or cable runs, not installed in conduit, that penetrate outside building walls, supporting walls, and two hour fire barriers, with an approved fire retardant sealant.

C. AC Power:
1. Bond to ground contractor-installed equipment and identified Government-furnished equipment, to eliminate shock hazards and to minimize ground loops, common mode returns, noise pickup, and crosstalk for total ground resistance of 0.1 Ohm or less.
2. Use of conduit, signal duct or cable trays as system or electrical ground is not permitted; use these items only for dissipation of internally generated static charges (not to be confused with externally generated lightning) that can be applied or generated outside mechanical and physical confines of system to earth ground. Discovery of improper system grounding is grounds to declare system unacceptable and termination of all system acceptance testing.
3. Cabinet Bus: Extend a common ground bus of at least #10 AWG solid copper wire throughout each equipment cabinet and bond to system ground. Provide a separate isolated ground connection from each equipment cabinet ground bus to system ground. Do not tie equipment ground busses together.
4. Equipment: Bond equipment to cabinet bus with copper braid equivalent to at least #12 AWG. Self-grounding equipment enclosures, racks or cabinets, that provide OEM certified functional ground connections through physical contact with installed equipment, are acceptable alternatives.

3.2 EQUIPMENT IDENTIFICATION

A. Control, Communication and Signal System Identification:
1. Install a permanent wire marker on each wire at each termination.

2. Identify cables with numbers and letters on the labels corresponding to those on wiring diagrams used for installing systems.
3. Install labels retaining their markings after cleaning.
4. In each maintenance hole (manhole) and handhole, install embossed brass tags to identify system served and function.

B. Labeling:

1. Industry Standard: ANSI/TIA-606-B.
2. Print lettering for voice and data circuits using laser/jet printers
3. Cable and Wires (hereinafter referred to as "cable"): Label cables at both ends in accordance with industry standard. Provide permanent labels in contrasting colors. Identify cables matching system Record Wiring Diagrams.
4. Equipment: Permanently labeled system equipment with contrasting plastic laminate or bakelite material. Label system equipment on face of unit corresponding to its source.
5. Conduit, Cable Duct, and Cable Tray: Label conduit, duct and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum of 3 meters (10 ft.) identifying system. Label each enclosure according to this standard.
6. Termination Hardware: Label workstation outlets and patch panel connections using color coded labels with identifiers in accordance with industry standard and Record Wiring Diagrams.

3.3 TESTING

A. Minimum test requirements are for impedance compliance, inductance, capacitance, signal level compliance, opens, shorts, cross talk, noise, and distortion, and split pairs on cables in frequency ranges specified.

B. Tests required for data cable must be made to confirm operation of this cable at minimum 10 Mega (M) Hertz (Hz) full bandwidth, fully channel loaded and a Bit Error Rate of a minimum of 10-6 at maximum rate of speed.

C. Provide cable installation and test records at acceptance testing to COR and thereafter maintain in facility's telephone switch room.

D. Record changes (used pair, failed pair) in these records as change occurs.

E. Test cables after installation and replace any defective cables.

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SECTION 27 15 00
COMMUNICATIONS STRUCTURED CABLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies a complete and operating voice and digital structured cabling distribution system and associated equipment and hardware to be installed in VA Medical Center, here-in-after referred to as the "facility".

1.2 RELATED WORK

A. Wiring devices: Section 26 27 26, WIRING DEVICES.

B. General electrical requirements that are common to more than one section in Division 27: Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

C. Conduits for cables and wiring: Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.

D. Low voltage cabling system infrastructure: Section 27 10 00, CONTROL, COMMUNICATION AND SIGNAL WIRING.

1.3 SUBMITTALS

A. In addition to requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS provide:

1. List of test equipment as per Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

B. Certifications:

1. Submit written certification from OEM indicating that proposed supervisor of installation and proposed provider of contract maintenance are authorized representatives of OEM. Include individual's legal name and address and OEM warranty credentials in the certification.
2. Pre-acceptance Certification: Submit in accordance with test procedures.
3. Test system cables and certify to COR before proof of performance testing can be conducted. Identify each cable as labeled on as-installed drawings.
4. Provide current and qualified test equipment OEM training certificates and product OEM installation certification for contractor installation, maintenance, and supervisory personnel.

C. Closeout Submittal: Provide document from OEM certifying that each item of equipment installed conforms to OEM published specifications.

1.4 WARRANTY

A. Work subject to terms of Article "Warranty of Construction," FAR clause 52.246-21.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide complete system including “punch down” and cross-connector blocks voice and data distribution sub-systems, and associated hardware including telecommunications outlets (TCO); copper and fiber optic distribution cables, connectors, “patch” cables, “break out” devices and equipment cabinets, interface cabinets, and radio relay equipment rack.

B. Industry Standards:

1. Cable distribution systems provided under this section are connected to systems identified as critical care performing life support functions.
2. Conform to National and Local Life Safety Codes (whichever are more stringent), NFPA, NEC, this section, Joint Commission Life Safety Accreditation requirements, and OEM recommendations, instructions, and guidelines.
3. Provide supplies and materials listed by a nationally recognized testing laboratory where such standards are established for supplies, materials or equipment.
4. Refer to industry standards and minimum requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and guidelines listed.
5. Active and passive equipment required by system design and approved technical submittal; shall conform to each UL standard in effect for equipment, when technical submittal was reviewed and approved by Government or date when COR accepted system equipment to be replaced. Where a UL standard is in existence for equipment to be used in completion of this contract, equipment shall bear approved NRTL label.

C. System Performance: Provide complete system to meet or exceed TIA Category 6A requirements.

D. Provide continuous inter- and/or intra-facility voice, data, and analog service.

1. Provide voice and data cable distribution system based on a physical "Star" topology.

E. Specific Subsystem Requirements: Provide products necessary for a complete and functional voice, data, analog and videotele communications cabling system, including backbone cabling system, patch panels and cross-connections, horizontal cabling systems, jacks, faceplates, and patch cords.

F. Coordinate size and type of conduit, pathways and firestopping for maximum 40 percent cable fill with subcontractors.

G. Terminate all interconnecting twisted pair, fiber-optic or coaxial cables on patch panels or punch blocks. Terminate unused or spare conductors and fiber strands. Do not leave unused or spare twisted pair wire, fiber-optic or coaxial cable unterminated, unconnected, loose or unsecured.

H. Color code distribution wiring to conform to ANSI/TIA 606-B and construction documents, whichever is more stringent. Label all equipment, conduit, enclosures, jacks, and cables on record drawings, to facilitate installation and maintenance.

I. In addition to requirements in Section 27 05 11, REQUIREMENTS FOR COMMUNICATION INSTALLATIONS, provide stainless steel faceplates with plastic covers over labels.

2.2 EQUIPMENT AND MATERIALS

A. Cable Systems - Twisted Pair:

1. General:

a. Provide cable (i.e. horizontal cabling) conforming to accepted industry standards with regards to size, color code, and insulation.

b. Some areas can be considered "plenum". Comply with all codes pertaining to plenum environments. It is contractor's responsibility to review the VA's cable requirements with COR and OI&T Service prior to installation to confirm type of environment present at each location.

c. Provide proper test equipment to confirm that cable pairs meet each OEM's standard transmission requirements, and ensure cable carries data transmissions at required speeds, frequencies, and fully loaded bandwidth.

2. Telecommunications Rooms (TR):

a. In TR's served with UTP and STP terminate UTP and STP cable on RJ-45, 8-pin connectors of separate 48-port modular patch panels,
b. Provide connecting cables required to extend backbone cables (i.e. patch cords, twenty-five pair.), to ensure complete and operational distribution systems.
c. In TR's, which are only served by a UTP and STP backbone cable, terminate cable on separate modular connecting devices, Type 110A punch down blocks (or equivalent), dedicated to data applications.

3. Horizontal Cable: Installed from TCO jack to the TR patch panels.
   a. Tested to ANSI/TIA-568-C.2-10, TSB-155 Category 6A requirements including NEXT, ELFEXT (Pair-to-Pair and Power Sum), Insertion Loss (attenuation), Return Loss, and Delay Skew.
   b. Minimum Transmission Parameters: 500 MHz CAT 6A.
   c. CAT 6A (10 Gigabit Ethernet (GbE))
   d. Provide four pair 0.326 mm2 (22 AWG) for Category 6A cable
   e. Terminate all four pairs on same port at patch panel in TR.
   f. Terminate all four pairs on same jack, at work area Telecommunication Outlets (TCO):
      1) Jacks: Minimum three eight-pin RJ-45 ANSI/TIA-568-C.2 Category 6A Type jacks at TCO.
         a) Top Port: RJ-45 jack compatible with RJ-11 plug for voice.
         b) Bottom Two Ports: Unkeyed RJ-45 jacks for data.

B. Cross-Connect Systems (CCS):
   1. Copper Cables: Provide copper CCS sized to connect cables at TR and allow for a minimum of 50 percent anticipated growth.
   2. Maximum DC Resistance per Cable Pair: 28.6 Ohms per 305 m (1,000 feet).

C. Telecommunication Room (TR):
   1. Terminate horizontal, copper, on appropriate cross-connection systems (CCS) containing patch panels, punch blocks, and breakout devices provided in enclosures and tested, regardless of installation method, mounting, termination, or cross-connecting used. Provide cable management system as a part of each CCS.

D. Voice/Data (or Telephone) Cable Cross-Connection Subsystem:
   1. Provide Insulation Displacement Connection (IDC) hardware.

2. Provide the following for each Category 6A Cabling System termination, RJ-45 patch cord connector to RJ-45 patch cord connector.
   a. Provide terminations to be accessible without need for disassembly of IDC wafer. Provide IDC wafers removable from their mounts to facilitate testing on either side of connector.
   b. Provide removable designation strips or labels to allow for inspection of terminations.
   c. Provide cable management system as a part of IDC.
3. Provide IDC connectors capable of re-terminations, without damage, a minimum of 200 IDC insertions or withdrawals on either side of connector panel.

E. Horizontal Cabling (HC):
1. Horizontal cable length to farthest system outlet to be maximum of 90 m (295 ft).
2. Splitting of pairs within a cable between different jacks is not permitted.

2.3 DISTRIBUTION EQUIPMENT AND SYSTEMS

A. Telecommunication Outlet:
2. TCO consists of minimum two voice (telephone)with six port position RJ45 jack mounted in a separate steel outlet box 100 mm (4 inches) x 100 mm (4 inches) x 63 mm (2-1/2 inches) minimum with a labeled stainless steel faceplate. Data and Voice Multi-Conductor:
   a. Unshielded F/UTP cable with solid conductors.
   b. Able to handle the power and voltage used over the distance required.
   c. Meets TIA transmission performance requirements of Category 6A.
   d. Meets or exceeds TIA-EIA-568-C.2-10, TSB-155.
   e. Technical Characteristics:
      1) Cable diameter: 0.326 mm2 (22 AWG) cable
      2) Working no shielded: 300 Volts.
      3) Working Shield: 350 V.
      4) Bend Radius: 10 times cable outside diameter.
      5) Impedance: 100 Ohms + 15%, BAL.
      6) Bandwidth: 500 MHz for CAT 6A.
      7) DC Resistance: Maximum 9.38 Ohms/100m (328 ft.) at 20 degrees C.

8) Maximum Mutual Capacitance: 5.6 nF per 100 m (328 ft.).

9) Data cable color: BLUE or as shown on the drawings.

10) CMR (riser) Cable shall have star filler and rip cord.

11) CMP (plenum) cable shall have filler and rip cord.

12) NEXT loss headroom +5dB

13) PSNEXT loss Headroom +5dB

14) ACRF headroom +6dB

15) PSACRF headroom +6dB

16) Shield Coverage:

a) Overall Outside (if OEM specified): 100 percent.

b) Individual Pairs (if OEM specified): 100 percent.

17) Maximum attenuation for 100m (328 ft.) at 20° C:

Frequency (MHz)	Category 6A (dB)
1	2.1
4	3.8
8	5.3
10	5.9
16	7.5
20	8.4
25	9.4
31.25	10.5
62.5	15.0
100	19.1
200	27.6
250	31.1
300	34.3
400	40.1
500	45.3

B. Outlet Connection Cables:

1. Data:

a. Provide a connection cable for each TCO data jack in system with 10 percent spares to connect a data instrument to TCO data jack. Do not provide data terminals/equipment.

b. Technical Characteristics:

1) Length: Minimum 1.8 m (6 feet).

2) Cable: Category 6A.

3) Connector: CAT 6A RJ-45 male on each end.

4) Color Coding: Required, data industry standard.

5) Size: Minimum 22 AWG for CAT 6A.

2. Voice (Telephone):

a. Provide a connection cable for each TCO voice (telephone) jack in system with 10 percent spares able to connect voice (telephone) connection cable from voice (telephone) instrument to TCO voice (telephone) jack. Do not provide voice (telephone) instruments or equipment.

b. Technical Characteristics:

1) Length: Minimum 1.8 m (6 feet).

2) Cable: Same as data.

3) Connector: CAT 6A RJ-11/45 compatible male on each end.

4) Size: Minimum 22 AWG for CAT 6A.

5) Color Coding: Required, telephone industry standard.

C. System Connectors:

1. Modular (RJ-45/11 and RJ-45): Provide voice and high-speed data transmission applications type modular plugs compatible with voice (telephone) instruments, computer terminals, and other type devices requiring linking through modular telecommunications outlet to the system compatible with UTP F/UTP cables.

a. Technical Characteristics:

1) Number of Pins:

a) RJ-45: Eight.

b) RJ-11/45: Compatible with RJ-45.

2) Dielectric: Surge.

3) Voltage: Minimum 1,000V RMS, 60 Hz at one minute.

4) Current: 2.2A RMS at 30 minutes or 7.0A RMS at 5.0 seconds.

5) Leakage: Maximum 100 µA.

6) Connections:

a) Initial contact resistance: Maximum 20 milli-Ohms.

b) Insulation displacement: Maximum 10 milli-Ohms.

c) Interface: shall interface with modular jacks from a variety of OEMs. RJ-11/45 plugs provide connection when used in RJ-45 jacks.

d) Durability: Minimum 200 insertions/withdrawals.

D. Conduit and Signal Ducts:

1. Conduit:

a. Provide conduit or sleeves for cables penetrating walls, ceilings, floors, interstitial space, fire barriers.
b. Minimum Conduit Size: 31 mm (1-1/4 inch).
c. Provide separate conduit and signal ducts for each cable type installation.
d. When metal (plastic covered, flexible cable protective armor.) systems are authorized to be provided for use in system, follow installation guidelines and standard specified in Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS and NEC.
e. Maximum 40 percent conduit fill for cable installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install for ease of operation, maintenance, and testing.

B. Install system to comply with NFPA 70 National Electrical Code, NFPA 99 Health Care Facilities, NFPA 101 Life Safety Code, Joint Commission Manual for Health Care Facilities, and original equipment manufacturers' (OEM) installation instructions.

C. Cable Systems Installation:

1. Install system cables in cable duct, cable tray, cable runway, conduit or when specifically approved, flexible NEC Article 800 communications raceway. Confirm drawings show sufficient quantity and size of cable pathways. If flexible communications raceway is used, install in same manner as conduit.
2. Coordinate outside plant and backbone cables to furnish number of cable pairs for system requirements and obtain approval of COR and IT Service prior to installation.
3. Bond to ground metallic cable sheaths. (i.e., risers, underground, horizontal.).
4. Install temporary cable to not present a pedestrian safety hazard and be responsible for all work associated with removal. Temporary cable installations are not required to meet Industry Standards; but, shall be reviewed and accepted by COR, IT Service, FMS and SMCS 005OP2H3 (202-461-5310) prior to installation.

D. Labeling:

1. Industry Standard: Provide labeling in accordance with ANSI/TIA-606-B.
2. Print lettering of labels with laser jet printers; handwritten labels are not acceptable.
3. Label both ends of all cables in accordance with industry standard. Provide permanent Labels in contrasting colors and identify according to system “Record Wiring Diagrams”.
4. Termination Hardware: Label workstation outlets and patch panel connections using color coded labels with identifiers in accordance with industry standard and record on “Record Wiring Diagrams”.

E. Cable Slack

1. Provide 3 m (10 ft) in TR rooms for Copper balanced twisted pair cabling.
2. Provide 1 m (3 ft) in the work area outlet for balanced twisted pair cabling.

3.2 FIELD QUALITY CONTROL

A. Interim Inspection:

1. Verify that equipment provided adheres to installation requirements of this section. Interim inspection shall be conducted by a factory-certified representative and witnessed by COR.
2. Check each item of installed equipment to ensure appropriate NRTL label.
3. Verify cabling terminations in telecommunications rooms and at workstations adhere to color code for T568B pin assignments and cabling connections comply with TIA standards.
4. Visually confirm marking of cables, faceplates, patch panel connectors and patch cords.
5. Perform fiber optical field inspection tests via attenuation measurements on factory reels and provide results along with manufacturer certification for factory reel tests. Remove failed cable reels from project site upon attenuation test failure.
6. Notify COR of the estimated date the contractor expects to be ready for interim inspection, at least 20 working days before requested inspection date, so interim inspection does not affect systems’ completion date.
7. Provide results of interim inspection to COR. If major or multiple deficiencies are discovered, COR can require a second interim

inspection before permitting contractor to continue with system installation.

8. Do not proceed with installation until COR determines if an additional inspection is required. In either case, re-inspection of deficiencies noted during interim inspections shall be part of the proof of performance test.

B. Performance Testing:

1. Perform Category 6A tests in accordance with TIA-568-B.1 and TIA-568-B.2. Include the following tests - wire map, length, insertion loss, return loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, propagation delay and delay skew.
2. Fiber Optic Links: Perform end-to-end fiber optic cable link tests in accordance with TIA-568-B.3.

C. Total System Acceptance Test: Perform verification tests for UTP STP copper cabling systems after complete telecommunication distribution system and workstation outlet are installed.

3.3 MAINTENANCE

A. Accomplish the following minimum requirements during one-year warranty period:

1. Respond and correct on-site trouble calls, during standard work week:
   a. A routine trouble call within one working day of its report. A routine trouble is considered a trouble which causes a system outlet, station, or patch cord to be inoperable.
   b. Standard work week is considered 8:00 A.M. to 5:00 P.M., Monday through Friday exclusive of Federal holidays.
2. Respond to an emergency trouble call within six hours of its report. An emergency trouble is considered a trouble which causes a subsystem or distribution point to be inoperable at any time.
3. Respond on-site to a catastrophic trouble call within four hours of its report. A catastrophic trouble call is considered total system failure.
   a. If a system failure cannot be corrected within four hours (exclusive of standard work time limits), provide alternate equipment, or cables within four hours after four-hour trouble shooting time.

b. Routine or emergency trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units) are also be deemed as a catastrophic trouble.

4. Provide COR written report itemizing each deficiency found and the corrective action performed during each official reported trouble call. Provide COR with sample copies of reports for review and approval at beginning of total system acceptance test.

3.4 TESTING OF COMPLETD CABLING

A. Once UTP, SUTP and fiber data cabling has been pulled and terminated at both ends, the contractor shall test each cable run to confirm it is capable of supporting data transmission rates indicated in the bid document above and shall conforms to the cabling standards listed above.

B. The contractor shall supply a report documenting the test results.

C. The report shall be submitted in electronic format prior to acceptance by OIT.

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SECTION 28 05 00
COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section, Common Work Results for Electronic Safety and Security (ESS), applies to all sections of Division 28.

B. Furnish and install fully functional electronic safety and security cabling system(s), equipment and approved accessories in accordance with the specification section(s), drawing(s), and referenced publications. Capacities and ratings of cable and other items and arrangements for the specified items are shown on each system's required Bill of Materials (BOM) and verified on the approved system drawing(s). If there is a conflict between contract's specification(s) and drawings(s), the contract's specification requirements shall prevail.

C. The Contractor shall provide a fully functional and operating ESS, programmed, configured, documented, and tested as required herein and the respective Safety and Security System Specification(s). The Contractor shall provide calculations and analysis to support design and engineering decisions as specified in submittals. The Contractor shall provide and pay all labor, materials, and equipment, sales and gross receipts and other taxes. The Contractor shall secure and pay for plan check fees, permits, other fees, and licenses necessary for the execution of work as applicable for the project. Give required notices; the Contractor will comply with codes, ordinances, regulations, and other legal requirements of public authorities, which bear on the performance of work.

D. The Contractor shall provide an ESS, installed, programmed, configured, documented, and tested. The security system shall include: physical access control, intrusion detection, duress alarms, elevator control interface, video assessment and surveillance, video recording and storage, delayed egress, personal protection system, intercommunication system, fire alarm interface, equipment cabinetry, dedicated photo badging system and associated live camera, report printer, photo badge printer, and uninterruptible power supplies (UPS) interface. Operator training shall not be required as part of the Security Contractors scope and shall be provided by the Owner. The Security Contractor shall

still be required to provide necessary maintenance and troubleshooting manuals as well as submittals as identified herein. The work shall include the procurement and installation of electrical wire and cables, the installation and testing of all system components. Inspection, testing, demonstration, and acceptance of equipment, software, materials, installation, documentation, and workmanship, shall be as specified herein. The Contractor shall provide all associated installation support, including the provision of primary electrical input power circuits.

E. Repair Service Replacement Parts On-site service during the warranty period shall be provided as specified under "Emergency Service". The Contractor shall guarantee all parts and labor for a term of one (1) year, unless dictated otherwise in this specification from the acceptance date of the system as described in Part 5 of this Specification. The Contractor shall be responsible for all equipment, software, shipping, transportation charges, and expenses associated with the service of the system for one (1) year. The Contractor shall provide 24-hour telephone support for the software program at no additional charge to the owner. Software support shall include all software updates that occur during the warranty period.

F. Section Includes:

1. Description of Work for Electronic Security Systems,
2. Electronic security equipment coordination with relating Divisions,
3. Submittal Requirements for Electronic Security,
4. Miscellaneous Supporting equipment and materials for Electronic Security,
5. Electronic security installation requirements.

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.

B. Section 07 84 00 - FIRESTOPPING. Requirements for firestopping application and use.

C. Section 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS. Requirements for connection of high voltage.

D. Section 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW). Requirements for power cables.

E. Section 26 05 33 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS. Requirements for infrastructure.

F. Section 28 05 13 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for conductors and cables.

G. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for grounding of equipment.

H. Section 28 05 28.33 - CONDUITS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for infrastructure.

I. Section 28 31 00 FIRE DETECTION AND ALARM

1.3 DEFINITIONS

A. AGC: Automatic Gain Control.

B. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

C. BICSI: Building Industry Consulting Service International.

D. CCD: Charge-coupled device.

E. CPU: Central processing unit.

F. Credential: Data assigned to an entity and used to identify that entity.

G. DGP: Data Gathering Panel – component of the Physical Access Control System capable to communicate, store and process information received from readers, reader modules, input modules, output modules, and Security Management System.

H. DTS: Digital Termination Service: A microwave-based, line-of-sight communications provided directly to the end user.

I. EMI: Electromagnetic interference.

J. EMT: Electric Metallic Tubing.

K. ESS: Electronic Security System.

L. File Server: A PC in a network that stores the programs and data files shared by users.

M. GFI: Ground fault interrupter.

N. IDC: Insulation displacement connector.

O. Identifier: A credential card, keypad personal identification number or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

P. I/O: Input/Output.

Q. LAN: Local area network.

R. LCD: Liquid-crystal display.

S. LED: Light-emitting diode.

T. Location: A Location on the network having a PC-to-Controller communications link, with additional Controllers at the Location connected to the PC-to-Controller link with RS-485 communications loop. Where this term is presented with an initial capital letter, this definition applies.

U. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

V. M-JPEG: Motion – Joint Photographic Experts Group.

W. MPEG: Moving picture experts group.

X. NEC: National Electric Code

Y. NEMA: National Electrical Manufacturers Association

Z. NFPA: National Fire Protection Association

AA. NTSC: National Television System Committee.

BB. NRTL: Nationally Recognized Testing Laboratory.

CC. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

DD. PACS: Physical Access Control System; A system comprised of cards, readers, door controllers, servers and software to control the physical ingress and egress of people within a given space

EE. PC: Personal computer. This acronym applies to the Central Station, workstations, and file servers.

FF. PCI Bus: Peripheral component interconnect; a peripheral bus providing a high-speed data path between the CPU and peripheral devices (such as monitor, disk drive, or network).

GG. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.

HH. RCDD: Registered Communications Distribution Designer.

II. RFI: Radio-frequency interference.

JJ. RIGID: Rigid conduit is galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded.

KK. RS-232: An TIA/EIA standard for asynchronous serial data communications between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.

LL. RS-485: An TIA/EIA standard for multipoint communications.

MM. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.

NN. SMS: Security Management System – A SMS is software that incorporates multiple security subsystems (e.g., physical access control, intrusion detection, closed circuit television, intercom) into a single platform and graphical user interface.

OO. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

PP. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

QQ. UPS: Uninterruptible Power Supply

RR. UTP: Unshielded Twisted Pair

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

B. Product Qualification:

1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.

C. Contractor Qualification:

1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of three (3) years' experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Security Management System's (PACS) manufacturer. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as

the proposed system. The references must include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system manufacturer certification for all technicians. The Contractor shall only utilize factory-trained technicians to install, program, and service the PACS. The Contractor shall only utilize factory-trained technicians to install, terminate and service controller/field panels and reader modules. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. The Contractor shall have a local service facility. The facility shall be located within 4 hours of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The Contracting Officer of Record(COR) reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.

2. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
3. Cable installer must have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide consistent oversight of the project cabling throughout design, layout, installation, termination and testing.

D. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 GENERAL ARANGEMENT OF CONTRACT DOCUMENTS

A. The Contract Documents supplement to this specification indicates approximate locations of equipment. The installation and/or locations of the equipment and devices shall be governed by the intent of the design; specification and Contract Documents, with due regard to actual site conditions, recommendations, ambient factors affecting the equipment and operations in the vicinity. The Contract Documents are diagrammatic and do not reveal all offsets, bends, elbows, components, materials, and other specific elements that may be required for proper installation. If any departure from the contract documents is deemed necessary, or in the event of conflicts, the Contractor shall submit details of such departures or conflicts in writing to the owner or owner’s representative for his or her comment and/or approval before initiating work.

B. Anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required or called by all, except if a provision clearly designed to negate or alter a provision contained in one or more of the other Contract Documents shall have the intended effect. In the event of conflicts among the Contract Documents, the Contract Documents shall take precedence in the following order: the Form of Agreement; the Supplemental General Conditions; the Special Conditions; the Specifications with attachments; and the drawings.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.

C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.

1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
2. Submittals shall be marked to show specification reference including the section and paragraph numbers.

3. Submit each section separately.

D. The submittals shall include the following:
   1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
   2. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.

E. Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted. Additional general provisions are as follows:
   1. The Contractor shall schedule submittals in order to maintain the project schedule.
   2. The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.
   3. Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware) which are required to produce an accurate and detailed depiction of the project.
   4. Manufacturer’s information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for COR and Contractor review stamps.

5. Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with VA CAD Standards CAD Standard Application Guide, and VA BIM Guide. FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED. The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the COR for approval before the initiation of work.
6. Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
   a. Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
      1) Where two (2) or more binders are necessary to accommodate data; correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and/or maintenance of the component or system.
      2) Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume number if applicable.
   b. Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.
   c. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
   d. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches, 20-pound, white bond paper.

e. Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.
   1) Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.
   2) If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a type written page indicating the drawing title, description of contents and drawing location at the appropriate location of the manual.
   3) Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16” tall.

f. Manual Content: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
   1) Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test and furnish the remaining manuals prior to contract completion.
   2) Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
   3) The manuals shall include:
      a) Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
      b) A control sequence describing start-up, operation, and shutdown.
      c) Description of the function of each principal item of equipment.

d) Installation and maintenance instructions.
e) Safety precautions.
f) Diagrams and illustrations.
g) Testing methods.
h) Performance data.
i) Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
j) Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

g. Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer to Group I through V Technical Data Package Submittal requirements for required section content.
h. Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.
i. Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.
j. General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name.

Under each product, list the name, address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.

k. Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.

l. Manufacturer’s Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.

m. Where manufacturer's standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.

n. Calculations: Provide a section for circuit and panel calculations.

o. Loading Sheets: Provide a section for DGP Loading Sheets.

p. Certifications: Provide section for Contractor’s manufacturer certifications.

7. Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer’s catalog numbers and conformance of

submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.

8. Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.
9. Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.

F. FIPS 201 Compliance Certificates
   1. Provide Certificates for all software components and device types utilizing credential verification. Provide certificates for:
      a. Certificate Management
         1) CAK Authentication System
         2) PIV Authentication System
         3) Certificate Validator
         4) Cryptographic Module
      b. <list devices and software>

G. Approvals will be based on complete submission of manuals together with shop drawings.

H. After approval and prior to installation, furnish the COR with one sample of each of the following:
   1. A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
   2. Each type of conduit and pathway coupling, bushing and termination fitting.
   3. Conduit hangers, clamps and supports.
   4. Duct sealing compound.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute (ANSI)/ International Code Council (ICC):

A117.1.....Standard on Accessible and Usable Buildings and Facilities

C. American National Standards Institute (ANSI)/ Security Industry Association (SIA):

AC-03.....Access Control: Access Control Guideline Dye Sublimation Printing Practices for PVC Access Control Cards

CP-01-00.....Control Panel Standard-Features for False Alarm Reduction

PIR-01-00.....Passive Infrared Motion Detector Standard - Features for Enhancing False Alarm Immunity

TVAC-01.....CCTV to Access Control Standard - Message Set for System Integration

D. American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA):

330-09.....Electrical Performance Standards for CCTV Cameras

375A-76.....Electrical Performance Standards for CCTV Monitors

E. American National Standards Institute (ANSI):

ANSI S3.2-99.....Method for measuring the Intelligibility of Speech over Communications Systems

F. American Society for Testing and Materials (ASTM)

B1-07.....Standard Specification for Hard-Drawn Copper Wire

B3-07.....Standard Specification for Soft or Annealed Copper Wire

B8-04.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C1238-97 (R03).....Standard Guide for Installation of Walk-Through Metal Detectors

D2301-04.....Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape

G. Architectural Barriers Act (ABA), 1968

H. Department of Justice: American Disability Act (ADA)

28 CFR Part 36-2010 ADA Standards for Accessible Design

I. Department of Veterans Affairs:

1. VHA National CAD Standard Application Guide, 2006

J. VA BIM Guide, V1.0 10

K. Federal Communications Commission (FCC):

L. (47 CFR 15) Part 15 Limitations on the Use of Wireless Equipment/Systems

M. Federal Information Processing Standards (FIPS):

FIPS-201-1.....Personal Identity Verification (PIV) of Federal Employees and Contractors

N. Federal Specifications (Fed. Spec.):

A-A-59544-08.....Cable and Wire, Electrical (Power, Fixed Installation)

O. Government Accountability Office (GAO):

GAO-03-8-02.....Security Responsibilities for Federally Owned and Leased Facilities

P. Homeland Security Presidential Directive (HSPD):

HSPD-12.....Policy for a Common Identification Standard for Federal Employees and Contractors

Q. Institute of Electrical and Electronics Engineers (IEEE):

81-1983.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

802.3af-08.....Power over Ethernet Standard

802.3at-09 .....Power over Ethernet (PoE) Plus Standard

C2-07.....National Electrical Safety Code

C62.41-02.....IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

C95.1-05.....Standards for Safety Levels with Respect to Human Exposure in Radio Frequency Electromagnetic Fields

R. International Organization for Standardization (ISO):

7810.....Identification cards – Physical characteristics

7811.....Physical Characteristics for Magnetic Stripe Cards

7816-1.....Identification cards - Integrated circuit(s) cards with contacts - Part 1: Physical characteristics

7816-2.....Identification cards - Integrated circuit cards - Part 2: Cards with contacts -Dimensions and location of the contacts

7816-3.....Identification cards - Integrated circuit cards - Part 3: Cards with contacts - Electrical interface and transmission protocols

7816-4.....Identification cards - Integrated circuit cards - Part 11: Personal verification through biometric methods

7816-10.....Identification cards - Integrated circuit cards - Part 4: Organization, security and commands for interchange

14443.....Identification cards - Contactless integrated circuit cards; Contactless Proximity Cards Operating at 13.56 MHz in up to 5 inches distance

15693.....Identification cards -- Contactless integrated circuit cards - Vicinity cards; Contactless Vicinity Cards Operating at 13.56 MHz in up to 50 inches distance

19794.....Information technology - Biometric data interchange formats

S. National Electrical Contractors Association

303-2005.....Installing Closed Circuit Television (CCTV) Systems

T. National Electrical Manufactures Association (NEMA):

250-08.....Enclosures for Electrical Equipment (1000 Volts Maximum)

TC-3-04.....PVC Fittings for Use with Rigid PVC Conduit and Tubing

FB1-07.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

U. National Fire Protection Association (NFPA):

70-2018..... National Electrical Code (NEC)

731-2017.....Standards for the Installation of Electric Premises Security Systems

99-2018.....Health Care Facilities

V. National Institute of Justice (NIJ)

0601.02-03.....Standards for Walk-Through Metal Detectors for use in Weapons Detection

0602.02-03.....Hand-Held Metal Detectors for Use in Concealed Weapon and Contraband Detection

W. National Institute of Standards and Technology (NIST):

IR 6887 V2.1.....Government Smart Card Interoperability Specification (GSC-IS)

Special Pub 800-37...Guide for Applying the Risk Management Framework to Federal Information Systems

Special Pub 800-63...Electronic Authentication Guideline

Special Pub 800-73-3.Interfaces for Personal Identity Verification (4 Parts)

.....Pt. 1- End Point PIV Card Application Namespace, Data Model & Representation

.....Pt. 2- PIV Card Application Card Command Interface

.....Pt. 3- PIV Client Application Programming Interface

.....Pt. 4- The PIV Transitional Interfaces & Data Model Specification

Special Pub 800-76-1.Biometric Data Specification for Personal Identity Verification

Special Pub 800-78-2.Cryptographic Algorithms and Key Sizes for Personal Identity Verification

Special Pub 800-79-1.Guidelines for the Accreditation of Personal Identity Verification Card Issuers

Special Pub 800-85B-1 DRAFTPIV Data Model Test Guidelines

Special Pub 800-85A-2 PIV Card Application and Middleware Interface Test Guidelines (SP 800-73-3 compliance)

Special Pub 800-96...PIV Card Reader Interoperability Guidelines

Special Pub 800-104A.Scheme for PIV Visual Card Topography

X. Occupational and Safety Health Administration (OSHA):

29 CFR 1910.97.....Nonionizing radiation

Y. Section 508 of the Rehabilitation Act of 1973

Z. Security Industry Association (SIA):

AG-01 .....Security CAD Symbols Standards

AA. Underwriters Laboratories, Inc. (UL):

1-05.....Flexible Metal Conduit

5-04.....Surface Metal Raceway and Fittings

6-07.....Rigid Metal Conduit

44-05.....Thermoset-Insulated Wires and Cables

50-07.....Enclosures for Electrical Equipment

83-08.....Thermoplastic-Insulated Wires and Cables

294-99.....The Standard of Safety for Access Control System Units

305-08.....Standard for Panic Hardware

360-09.....Liquid-Tight Flexible Steel Conduit

444-08.....Safety Communications Cables

464-09.....Audible Signal Appliances

467-07.....Electrical Grounding and Bonding Equipment

486A-03.....Wire Connectors and Soldering Lugs for Use with Copper Conductors

486C-04.....Splicing Wire Connectors

486D-05.....Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations

486E-00.....Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable

514A-04.....Metallic Outlet Boxes

514B-04.....Fittings for Cable and Conduit
51-05.....Schedule 40 and 80 Rigid PVC Conduit
609-96.....Local Burglar Alarm Units and Systems
634-07.....Standards for Connectors with Burglar-Alarm Systems
636-01.....Standard for Holdup Alarm Units and Systems
639-97.....Standard for Intrusion-Detection Units
651-05.....Schedule 40 and 80 Rigid PVC Conduit
651A-07.....Type EB and A Rigid PVC Conduit and HDPE Conduit
752-05.....Standard for Bullet-Resisting Equipment
797-07.....Electrical Metallic Tubing
827-08.....Central Station Alarm Services
1037-09.....Standard for Anti-theft Alarms and Devices
1635-10.....Digital Alarm Communicator System Units
1076-95.....Standards for Proprietary Burglar Alarm Units and Systems
1242-06.....Intermediate Metal Conduit
1479-03.....Fire Tests of Through-Penetration Fire Stops
1981-03.....Central Station Automation System
2058-05.....High Security Electronic Locks
60950.....Safety of Information Technology Equipment
60950-1.....Information Technology Equipment - Safety - Part 1: General Requirements

BB. Uniform Federal Accessibility Standards (UFAS) 1984

CC. United States Department of Commerce:

Special Pub 500-101 .Care and Handling of Computer Magnetic Storage Media

1.8 COORDINATION

A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed.

1.9 MAINTENANCE & SERVICE

A. General Requirements

1. The Contractor shall provide all services required and equipment necessary to maintain the entire integrated electronic security system in an operational state as specified for a period of one (1) year after formal written acceptance of the system. The Contractor shall provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. See also General Project Requirements.

B. Description of Work

1. The adjustment and repair of the security system includes all software updates, panel firmware, and the following new items computers equipment, communications transmission equipment and data transmission media (DTM), local processors, security system sensors, physical access control equipment, facility interface, signal transmission equipment, and video equipment.

C. Personnel:

1. Service personnel shall be certified in the maintenance and repair of the selected type of equipment and qualified to accomplish all work promptly and satisfactorily. The COR shall be advised in writing of the name of the designated service representative, and of any change in personnel. The COR shall be provided copies of system manufacturer certification for the designated service representative.

D. Schedule of Work

1. The work shall be performed during regular working hours, Monday through Friday, excluding federal holidays.

E. System Inspections

1. These inspections shall include:
   a. The Contractor shall perform two (2) minor inspections at six (6) month intervals or more if required by the manufacturer, and two (2) major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.
      1) Minor Inspections shall include visual checks and operational tests of all console equipment, peripheral equipment, local processors, sensors, electrical and mechanical controls, and adjustments on printers.
      2) Major Inspections shall include all work described for Minor Inspections and the following: clean all system equipment and local processors including interior and exterior surfaces; perform diagnostics on all equipment; operational tests of the CPU, switcher, peripheral equipment, recording devices, monitors, picture quality from each camera; check, walk test, and calibrate each sensor; run all system software diagnostics and correct all problems; and resolve any previous outstanding problems.

F. Emergency Service

1. The owner shall initiate service calls whenever the system is not functioning properly. The Contractor shall provide the Owner with an emergency service center telephone number. The emergency service center shall be staffed 24 hours a day, 365 days a year. The Owner shall have sole authority for determining catastrophic and non-catastrophic system failures within parameters stated in General Project Requirements.
   a. For catastrophic system failures, the Contractor shall provide same day four (4) hour service response with a defect correction time not to exceed eight (8) hours from [notification] [arrival on site]. Catastrophic system failures are defined as any system failure that the Owner determines will place the facility(s) at increased risk.

b. For non-catastrophic failures, the Contractor within eight (8) hours with a defect correction time not to exceed 24 hours from notification.

G. Operation

1. Performance of scheduled adjustments and repair shall verify operation of the system as demonstrated by the applicable portions of the performance verification test.

H. Records & Logs

1. The Contractor shall maintain records and logs of each task and organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log shall contain all initial settings, calibration, repair, and programming data. Complete logs shall be maintained and available for inspection on site, demonstrating planned and systematic adjustments and repairs have been accomplished for the system.

I. Work Request

1. The Contractor shall separately record each service call request, as received. The record shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials used, and the date and time of commencement and completion. The Contractor shall deliver a record of the work performed within five (5) working days after the work was completed.

J. System Modifications

1. The Contractor shall make any recommendations for system modification in writing to the COR. No system modifications, including operating parameters and control settings, shall be made without prior written approval from the COR. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and other documentation affected.

K. Software

1. The Contractor shall provide all software updates when approved by the Owner from the manufacturer during the installation and 12-month warranty period and verify operation of the system. These updates

shall be accomplished in a timely manner, fully coordinated with the system operators, and incorporated into the operations and maintenance manuals and software documentation. There shall be at least one (1) scheduled update near the end of the first year's warranty period, at which time the Contractor shall install and validate the latest released version of the Manufacturer's software. All software changes shall be recorded in a log maintained in the unit control room. An electronic copy of the software update shall be maintained within the log. At a minimum, the contractor shall provide a description of the modification, when the modification occurred, and name and contact information of the individual performing the modification. The log shall be maintained in a white 3 ring binder and the cover marked "SOFTWARE CHANGE LOG".

1.10 MINIMUM REQUIREMENTS

A. References to industry and trade association standards and codes are minimum installation requirement standards.

B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.11 DELIVERY, STORAGE, & HANDLING

A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:

1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
2. Damaged equipment shall be, as determined by the COR, placed in first class operating condition or be returned to the source of supply for repair or replacement.
3. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or equal.
4. 4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

B. Central Station, Workstations, and Controllers:

1. Store in temperature and humidity controlled environment in original manufacturer's sealed containers. Maintain ambient temperature

between 10 to 30 deg C (50 to 85 deg F), and not more than 80 percent relative humidity, non-condensing.

2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
3. Mark packing list with designations which have been assigned to materials and equipment for recording in the system labeling schedules generated by cable and asset management system.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.12 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 2 to 50 deg C (36 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 1 enclosure.
2. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of -18 to 50 deg C (0 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 4X enclosures.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of -34 to 50 deg C (-30 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 137 km/h (85 mph) and snow cover up to 610 mm (24 in) thick. NEMA 250, Type 4X enclosures.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.

5. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

B. Security Environment: Use vandal resistant enclosures in high-risk areas where equipment may be subject to damage.

C. Console: All console equipment shall, unless noted otherwise, be rated for continuous operation under ambient environmental conditions of 15.6 to 29.4 deg C (60 to 85 deg F) and a relative humidity of 20 to 80 percent.

1.13 EQUIPMENT AND MATERIALS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Testing Is Specified:

1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the COR a minimum of 15 working days prior to the manufacturers making the factory tests.
2. Four copies of certified test reports containing all test data shall be furnished to the COR prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.14 ELECTRICAL POWER

A. Electrical power of 120 Volts Alternating Current (VAC) shall be indicated on the Division 26 drawings. Additional locations requiring primary power required by the security system shall be shown as part of these contract documents. Primary power for the security system shall be configured to switch to emergency backup sources automatically if interrupted without degradation of any critical system function. Alarms shall not be generated as a result of power switching, however, an indication of power switching on (on-line source) shall be provided to the alarm monitor. The Security Contractor shall provide an interface (dry contact closure) between the PACS and the Uninterruptible Power Supply (UPS) system so the UPS trouble signals and main power fail appear on the PACS operator terminal as alarms.

B. Failure of any on-line battery shall be detected and reported as a fault condition. Battery backed-up power supplies shall be provided sized for [8] <insert hours> hours of operation at actual connected load. Requirements for additional power or locations shall be included with the contract to support equipment and systems offered. The following minimum requirements shall be provided for power sources and equipment.

1. Uninterruptible Power Supply (UPS) on Emergency Power
   a. The following 120VAC circuits shall be provided by others. The Security Contractor shall coordinate exact locations with the Electrical Contractor:
      1) Security System Monitors and Keyboards: Control Room
      2) CPU: Control Equipment Room
      3) Communications equipment: Control Equipment Room and various sites.
      4) VASS Matrix Switcher: Control Equipment Room
      5) VASS: Control Equipment Room
      6) Digital Video Recorders, encoders & decoders: Control Room
      7) All equipment Room racked equipment.
      8) Network switches

1.15 TRANSIENT VOLTAGE SUPPRESSION, POWER SURGE SUPPLESION, & GROUNDING

A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade, except fiber optic cables, which serve as communication, control, or signal lines shall be protected

against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference.

1. A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
2. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.
3. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B.
4. Operating Temperature and Humidity: -40 to 85 deg C (-40 to 185 deg F), 0 to 95 percent relative humidity.

B. Grounding and Surge Suppression:

1. The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. To ensure the operation of over current devices, such as fuses, circuit breakers, and relays, underground-fault conditions.
2. Security Contractor shall engineer and provide proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards referenced in this document.
3. Principal grounding components and features. Include main grounding buses and grounding and bonding connections to service equipment.
4. Details of interconnection with other grounding systems. The lightning protection system shall be provided by the Security Contractor.
5. Locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
6. AC power receptacles are not to be used as a ground reference point.

7. Any cable that is shielded shall require a ground in accordance with the best practices of the trade and manufactures installation instructions.
8. Protection should be provided at both ends of cabling.

1.16 COMPONENT ENCLOSURES

A. Construction of Enclosures

1. Consoles, power supply enclosures, detector control and terminal cabinets, control units, wiring gutters, and other component housings, collectively referred to as enclosures, shall be so formed and assembled as to be sturdy and rigid.
2. Thickness of metal in-cast and sheet metal enclosures of all types shall not be less than those in Tables I and II, UL 611. Sheet steel used in fabrication of enclosures shall be not less than 14 gauge. Consoles shall be 16-gauge.
3. Doors and covers shall be flanged. Enclosures shall not have pre-punched knockouts. Where doors are mounted on hinges with exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent removal. Doors having a latch edge length of less than 609.6 mm (24 in) shall be provided with a single construction core. Where the latch edge of a hinged door is more than 609.6 mm (24 in) or more in length, the door shall be provided with a three-point latching device with construction core; or alternatively with two, one located near each end.
4. Any ventilator openings in enclosures and cabinets shall conform to the requirements of UL 611. Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with tip holes slotted. Mounting holes shall be in positions that remain accessible when all major operating components are in place and the door is open but shall be in accessible when the door is closed.
5. Covers of pull and junction boxes provided to facilitate initial installation of the system shall be held in place by tamper proof Torx Center post security screws. Stenciled or painted labels shall be affixed to such boxes indicating they contain no connections. These labels shall not indicate the box is part of the Electronic Security System (ESS).

B. Tamper Provisions and Tamper Switches:

1. Enclosures, cabinets, housings, boxes and fittings or every product description having hinged doors or removable covers and which contain circuits, or the integrated security system and its power supplies shall be provided with cover operated, corrosion-resistant tamper switches.
2. Tamper switches shall be arranged to initiate an alarm signal that will report to the monitoring station when the door or cover is moved. Tamper switches shall be mechanically mounted to maximize the defeat time when enclosure covers are opened or removed. It shall take longer than 1 second to depress or defeat the tamper switch after opening or removing the cover. The enclosure and tamper switch shall function together in such a manner as to prohibit direct line of sign to any internal component before the switch activates.
3. Tamper switches shall be inaccessible until the switch is activated. Have mounting hardware concealed so the location of the switch cannot be observed from the exterior of the enclosure. Be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating. Be spring-loaded and held in the closed position by the door or cover and be wired so they break the circuit when the door cover is disturbed. Tamper circuits shall be adjustable type screw sets and shall be adjusted by the contractor to eliminate nuisance alarms associated with incorrectly mounted tamper device shall annunciate prior to the enclosure door opening (within 1/4” tolerance. The tamper device or its components shall not be visible or accessing with common tools to bypass when the enclosure is in the secured mode.
4. The single gang junction boxes for the portrait alarming and pull boxes with less than 102 square mm will not require tamper switches.
5. All enclosures over 305 square mm shall be hinged with an enclosure lock.
6. Control Enclosures: Maintenance/Safety switches on control enclosures, which must be opened to make routing maintenance adjustments to the system and to service the power supplies, shall be push/pull-set automatic reset type.

7. Provide one (1) enclosure tamper switch for each 609 linear mm of enclosure lock side opening evenly spaced.
8. All security screws shall be Torx-Post Security Screws.
9. The contractor shall provide the owner with two (2) torx-post screwdrivers.

1.17 ELECTRONIC COMPONENTS

A. All electronic components of the system shall be of the solid-state type, mounted on printed circuit boards conforming to UL 796. Boards shall be plug-in, quick-disconnect type. Circuitry shall not be so densely placed as to impede maintenance. All power-dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current-carrying capacity.

1.18 SUBSTITUTE MATERIALS & EQUIPMENT

A. Where variations from the contract requirements are requested in accordance with the GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

B. In addition to this Section the Security Contractor shall also reference Section II, Products and associated divisions. The COR shall have final authority on the authorization or refusal of substitutions. If there are no proposed substitutions, a statement in writing from the Contractor shall be submitted to the COR stating same. In the preparation of a list of substitutions, the following information shall be included, as a minimum:
   1. Identity of the material or devices specified for which there is a proposed substitution.
   2. Description of the segment of the specification where the material or devices are referenced.
   3. Identity of the proposed substitute by manufacturer, brand name, catalog or model number and the manufacturer’s product name.
   4. A technical statement of all operational characteristic expressing equivalence to items to be substituted and comparison, feature-by-feature, between specification requirements and the material or devices called for in the specification; and Price differential.

C. Materials Not Listed: Furnish all necessary hardware, software, programming materials, and supporting equipment required to place the specified major subsystems in full operation. Note that some supporting equipment, materials, and hardware may not be described herein. Depending on the manufacturers selected by the COR, some equipment, materials and hardware may not be contained in either the Contract Documents or these written specifications but are required by the manufacturer for complete operation according to the intent of the design and these specifications. In such cases, the COR shall be given the opportunity to approve the additional equipment, hardware and materials that shall be fully identified in the bid and in the equipment list submittal. The COR shall be consulted in the event there is any question about which supporting equipment, materials, or hardware is intended to be included.

D. Response to Specification: The Contractor shall submit a point-by-point statement of compliance with each paragraph of the security specification. The statement of compliance shall list each paragraph by number and indicate "COMPLY" opposite the number for each paragraph where the Contractor fully complies with the specification. Where the proposed system cannot meet the requirements of the paragraph, and does not offer an equivalent solution, the offers shall indicate "DOES NOT COMPLY" opposite the paragraph number. Where the proposed system does not comply with the paragraph as written, but the bidder feels it will accomplish the intent of the paragraph in a manner different from that described, the offers shall indicate "COMPARABLE". The offers shall include a statement fully describing the "comparable" method of satisfying the requirement. Where a full and concise description is not provided, the offered system shall be considered as not complying with the specification. Any submission that does not include a point-by-point statement of compliance, as described above, shall be disqualified. Submittals for products shall be in precise order with the product section of the specification. Submittals not in proper sequence will be rejected.

1.19 LIKE ITEMS

A. Where two or more items of equipment performing the same function are required, they shall be exact duplicates produced by one manufacturer. All equipment provided shall be complete, new, and free of any defects.

1.20 WARRANTY

A. The Contractor shall, as a condition precedent to the final payment, execute a written guarantee (warranty) to the COR certifying all contract requirements have been completed according to the final specifications. Contract drawings and the warranty of all materials and equipment furnished under this contract are to remain in satisfactory operating condition (ordinary wear and tear, abuse and causes beyond his control for this work accepted) for one (1) year from the date the Contactor received written notification of final acceptance from the COR. Demonstration and training shall be performed prior to system acceptance. All defects or damages due to faulty materials or workmanship shall be repaired or replaced without delay, to the COR's satisfaction, and at the Contractor's expense. The Contractor shall provide quarterly inspections during the warranty period. The contractor shall provide written documentation to the COR on conditions and findings of the system and device(s). In addition, the contractor shall provide written documentation of test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty. The warranty period shall be extended until the last inspection and associated corrective actions are complete. When equipment and labor covered by the Contractor's warranty, or by a manufacturer's warranty, have been replaced or restored because of its failure during the warranty period, the warranty period for the replaced or repaired equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work. In the event any manufacturer customarily provides a warranty period greater than one (1) year, the Contractor's warranty shall be for the same duration for that component.

1.21 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment associated within the Security Control Room, Security Console and Security Equipment Room shall be UL 827, UL 1981, and UL 60950 compliant and rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.

B. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 Hz or 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification. All equipment shall have a back-up source of power that will provide a minimum of 8 hours of run time in the event of a loss of primary power to the facility.

C. The system shall be designed, installed, and programmed in a manner that will allow for ease of operation, programming, servicing, maintenance, testing, and upgrading of the system.

D. All equipment and materials for the system will be compatible to ensure correct operation.

2.2 EQUIPMENT ITEMS

A. The Security Management System shall provide full interface with all components of the security subsystem as follows:

1. Shall allow for communication between the Physical Access Control System and Database Management and all subordinate work and monitoring stations, enrollment centers for badging and biometric devices as part of the PACS, local annunciation centers, the electronic Security Management System (SMS), and all other VA redundant or backup command center or other workstations locations.
2. Shall provide automatic continuous communication with all systems that are monitored by the SMS, and shall automatically annunciate any communication failures or system alarms to the SMS operator providing identification of the system, nature of the alarm, and location of the alarm.
3. Controlling devices shall be utilized to interface the SMS with all field devices.

B. Wires and Cables:

1. Shall meet or exceed the manufactures recommendation for power and signals.
2. Shall be carried in an enclosed conduit system, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.
3. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space will contained in either EMT or RGS conduit.
4. All conduit, pull boxes, and junction boxes shall be marked with colored permanent tape or paint that will allow it to be distinguished from all other infrastructure conduit.
5. Conduit fills shall not exceed 50 percent unless otherwise documented.
6. A pull string shall be pulled along and provided with signal and power cables to assist in future installations.
7. At all locations where there is a wall penetration or core drilling is conducted to allow for conduit to be installed, fire stopping materials shall be applied to that area.
8. High voltage and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High voltage for the security subsystems shall be any cable or sets of cables carrying 30 VDC/VAC or higher.
9. For all equipment that is carrying digital data between the Security Control Room, Security Equipment Room, Security Console, or at a remote monitoring station, it shall not be less that 20 AWG and stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100% coverage. Cables with a single overall shield shall have a tinned copper shield drain wire.

2.3 TRANSIENT VOLTAGE SURGE SUPPRESSION DEVICES (TVSS) AND SURGE SUPPRESION

A. Grounding and Surge Suppression

1. The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. This is to ensure the operation of over current devices, such as fuses, circuit breakers, and relays, underground-fault conditions.

2. The Contractor shall engineer, provide, ad install proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards, referenced in this document.
3. Principal grounding components and features shall include: main grounding buses, grounding, and bonding connections to service equipment.
4. The Contractor shall provide detail drawings of interconnection with other grounding systems including lightning protection systems.
5. The Contractor shall provide details of locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
6. AC power receptacles are not to be used as a ground reference point.
7. Any cable that is shielded shall require a ground in accordance with applicable codes, the best practices of the trade, and all manufactures' installation instructions.

B. 120 VAC Surge Suppression
1. Continuous Current: Unlimited (parallel connection)
2. Max Surge Current: 13,500 Amps
3. Protection Modes: L - N, L - G, N - G
4. Warranty: Ten Year Limited Warranty
5. Dimension: 73.7 x 41.1 x 52.1 mm (2.90 x 1.62 x 2.05 in)
6. Weight: 2.88 g (0.18 lbs)
7. Housing: ABS

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

F. Equipment location shall be as close as practical to locations shown on the drawings.

G. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, , motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section 07 84 00 "Firestopping."

3.3 DEMONSTRATION AND TRAINING

A. Training shall be provided in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.

B. Training shall be provided for the particular equipment or system as required in each associated specification.

C. A training schedule shall be developed and submitted by the contractor and approved by the COR at least 30 days prior to the planned training.

D. Provide services of manufacturer’s technical representative for 2 hours to instruct VA personnel in operation and maintenance of units.

3.4 WORK PERFORMANCE

A. Job site safety and worker safety is the responsibility of the contractor.

B. For work on existing stations, arrange, phase and perform work to assure electronic safety and security service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

C. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to

its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.

D. Coordinate location of equipment and conduit with other trades to minimize interferences. See the GENERAL CONDITIONS.

3.5 TESTING AND ACCEPTANCE

A. Performance Requirements

1. General:

a. The Contractor shall perform contract field, performance verification, and endurance testing and make adjustments of the completed security system when permitted. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing. Written notification of planned testing shall be given to the COR at least 60 calendar days prior to the test and after the Contractor has received written approval of the specific test procedures.

b. The COR shall witness all testing and system adjustments during testing. Written permission shall be obtained from the COR before proceeding with the next phase of testing. Original copies of all data produced during performance verification and endurance testing shall be turned over to the COR at the conclusion of each phase of testing and prior to COR approval of the test.

2. Test Procedures and Reports: The test procedures, compliant w/ VA standard test procedures, shall explain in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification. The test reports shall be used to document results of the tests. The reports shall be delivered to the COR within seven (7) calendar days after completion of each test.

B. The inspection and test will be conducted by a factory-certified contractor representative and witnessed by a Government Representative. The results of the inspection will be officially recorded by a designated Government Representative and maintained on file by the COR (RE), until completion of the entire project. The results will be compared to the Acceptance Test results.

C. Contractor’s Field Testing (CFT)

1. The Contractor shall calibrate and test all equipment, verify DTM operation, place the integrated system in service, and test the integrated system. Ground rods installed by this Contractor within the base of camera poles shall be tested as specified in IEEE STD 142. The Contractor shall test all security systems and equipment, and provide written proof of a 100% operational system before a date is established for the system acceptance test. Documentation package for CFT shall include completed (fully annotated details of test details) for each device and system tested, and annotated loading sheets documenting complete testing to COR approval. CFT test documentation package shall conform to submittal requirements outlined in this Section. The Contractor's field testing procedures shall be identical to the COR's acceptance testing procedures. The Contractor shall provide the COR with a written listing of all equipment and software indicating all equipment and components have been tested and passed. The Contractor shall deliver a written report to theCOR stating the installed complete system has been calibrated, tested, and is ready to begin performance verification testing; describing the results of the functional tests, diagnostics, and calibrations; and the report shall also include a copy of the approved acceptance test procedure. Performance verification testing shall not take place until written notice by contractor is received certifying that a contractor's field test was successful.

D. Performance Verification Test (PVT)

1. Test team:

a. After the system has been pretested and the Contractor has submitted the pretest results and certification to the COR, then the Contractor shall schedule an acceptance test to date and give the COR written, notice as described herein, prior to the date the acceptance test is expected to begin. The system shall be tested in the presence of a Government Representative, an OEM certified representative, representative of the Contractor and other approved by the COR. The system shall be tested utilizing the approved test equipment to certify proof of performance, FCC, UL and Emergency Service compliance. The test shall verify that the total system meets all the requirements of this

specification. The notification of the acceptance test shall include the expected length (in time) of the test.

2. The Contractor shall demonstrate the completed Physical Access Control System PACS complies with the contract requirements. In addition, the Contractor shall provide written certification that the system is 100% operational prior to establishing a date for starting PVT. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The PVT will be stopped and aborted as soon as 10 technical deficiencies are found requiring correction. The Contractor shall be responsible for all travel and lodging expenses incurred for out-of-town personnel required to be present for resumption of the PVT. If the acceptance test is aborted, the re-test will commence from the beginning with a retest of components previously tested and accepted.
3. The PVT, as specified, shall not begin until receipt of written certification that the Contractors Field Testing was successful. This shall include certification of successful completion of testing as specified in paragraph “Contractor’s Field Testing”, and upon successful completion of testing at any time when the system fails to perform as specified. Upon termination of testing by the COR or Contractor, the Contractor shall commence an assessment period as described for Endurance Testing Phase II.
4. Upon successful completion of the acceptance test, the Contractor shall deliver test reports and other documentation, as specified, to the COR prior to commencing the endurance test.
5. Additional Components of the PVT shall include:
   a. System Inventory
      1) All Device equipment
      2) All Software
      3) All Logon and Passwords
      4) All Cabling System Matrices
      5) All Cable Testing Documents
      6) All System and Cabinet Keys

b. Inspection

1) Contractor shall record an inspection punch list noting all system deficiencies. The contractor shall prepare an inspection punch list format for CORs approval.

2) As a minimum the punch list shall include a listing of punch list items, punch list item location, description of item problem, date noted, date corrected, and details of how item was corrected.

6. Partial PVT - At the discretion of COR, the Performance Verification Test may be performed in part should a 100% compliant CFT be performed. In the event that a partial PVT will be performed instead of a complete PVT; the partial PVT shall be performed by testing 10% of the system. The contractor shall perform a test of each procedure on select devices or equipment.

E. Endurance Test

1. The Contractor shall demonstrate the specified probability of detection and false alarm rate requirements of the completed system. The endurance test shall be conducted in phases as specified below. The endurance test shall not be started until the COR notifies the Contractor, in writing, that the performance verification test is satisfactorily completed, training as specified has been completed, and correction of all outstanding deficiencies has been satisfactorily completed. VA shall operate the system 24 hours per day, including weekends and holidays, during Phase I and Phase III endurance testing. VA will maintain a log of all system deficiencies. The COR may terminate testing at any time the system fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period as described for Phase II. During the last day of the test, the Contractor shall verify the appropriate operation of the system. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation as specified to the COR prior to acceptance of the system.

F. Exclusions

1. The Contractor will not be held responsible for failures in system performance resulting from the following:

a. An outage of the main power in excess of the capability of any backup power source provided the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the PACS performed as specified.
b. Failure of an Owner furnished equipment or communications link, provided the failure was not due to Contractor furnished equipment, installation, or software.
c. Failure of existing Owner owned equipment, provided the failure was not due to Contractor furnished equipment, installation, or software.

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SECTION 28 05 13
CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the finishing, installation, connection, testing and certification the conductors and cables required for a fully functional for electronic safety and security (ESS) system.

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.

B. Section 28 05 00 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY. Requirements for general requirements that are common to more than one section in Division 28.

C. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 28 05 28.33 - CONDUITS AND BOXES FOR ELECTRONIC SECURITY AND SAFETY. Requirements for infrastructure.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

F. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

G. RCDD: Registered Communications Distribution Designer.

H. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.

I. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

J. UTP: Unshielded twisted pair.

1.4 QUALITY ASSURANCE

A. See Section 28 05 00 COMMON WORKS RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Paragraph 1.4.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

1. Manufacturer's Literature and Data: Showing each cable type and rating.
2. Certificates: Two weeks prior to final inspection, deliver to the Contracting Officer’s Representative (COR) four copies of the certification that the material is in accordance with the drawings and specifications and diagrams for cable management system.
3. Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
   a. Vertical and horizontal offsets and transitions.
   b. Clearances for access above and to side of cable trays.
   c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
   d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
   e. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
4. Wiring Diagrams. Show typical wiring schematics including the following:
   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.
5. Cable Administration Drawings: As specified in Part 3 "Identification" Article.
6. Project planning documents as specified in Part 3.
7. Maintenance Data: For wire and cable to include in maintenance manuals.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by the basic designation only.

B. American Society of Testing Material (ASTM):

D2301-04.....Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape

C. Federal Specifications (Fed. Spec.):

A-A-59544-08.....Cable and Wire, Electrical (Power, Fixed Installation)

D. National Fire Protection Association (NFPA):

70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-05.....Thermoset-Insulated Wires and Cables

83-08.....Thermoplastic-Insulated Wires and Cables

467-07.....Electrical Grounding and Bonding Equipment

486A-03.....Wire Connectors and Soldering Lugs for Use with Copper Conductors

486C-04.....Splicing Wire Connectors

486D-05.....Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations

486E-00.....Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable

514B-04.....Fittings for Cable and Conduit

1479-03.....Fire Tests of Through-Penetration Fire Stops

1.7 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use TDR
2. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.

3. Test each pair of UTP cable for open and short circuits.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 GENERAL

A. General: All cabling locations shall be in conduit systems as outlined in Division 28 unless a waiver is granted in writing or an exception is noted on the construction drawings.

B. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

1. Support brackets with cable tie slots for fastening cable ties to brackets.
2. Lacing bars, spools, J-hooks, and D-rings.
3. Straps and other devices.

C. Conduit and Boxes: Comply with requirements in Division 28 Section "Conduits and Backboxes for Electronic Safety and Security."[Flexible metal conduit shall not be used.]

1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".

2.3 UTP CABLE

A. Description: 100-ohm, 4-pair UTP, formed into 25-pair binder groups covered with a blue thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6.

4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
   a. Communications, General Purpose: Type CM or CMG ; or MPP, CMP, MPR, CMR, MP, or MPG.
   b. Communications, Plenum Rated: Type CMP ; or MPP, complying with NFPA 262.
   c. Communications, Riser Rated: Type CMR ; or MPP, CMP, or MPR, complying with UL 1666.
   d. Communications, Limited Purpose: Type CMX ; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG.
   e. Multipurpose: Type MP or MPG ; or MPP or MPR.
   f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
   g. Multipurpose, Riser Rated: Type MPR or MPP, complying with UL 1666.

2.4 UTP CABLE HARDWARE

A. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.

2.5 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CM.
   1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
   2. Polypropylene insulation.
   3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
   4. PVC jacket.
   5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
   1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
   2. Plastic insulation.
   3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
   4. Plastic jacket.

5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.6 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM or CMG.
1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.7 LOW-VOLTAGE CONTROL CABLE

A. Paired Lock Cable: NFPA 70, Type CMG.
1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.
1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

C. Paired Lock Cable: NFPA 70, Type CMG.
1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.

3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

D. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.
1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.8 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, power-limited cable, concealed in building finishes orpower-limited tray cable, in cable tray complying with UL 83.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.9 FIRE ALARM WIRE AND CABLE

A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, not less than] No. 18 AWG AWG orsize as recommended by system manufacturer.
1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

2.10 IDENTIFICATION PRODUCTS

A. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

C. Factory test UTP cables according to TIA/EIA-568-B.2.

D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.

E. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

F. Cable shall be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

2.12 WIRE LUBRICATING COMPOUND

A. Suitable for the wire insulation and conduit it is used with and shall not harden or become adhesive.

B. Shall not be used on wire for isolated type electrical power systems.

2.13 FIREPROOFING TAPE

A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.

B. The tape shall be self-extinguishing and shall not support combustion. It shall be arc-proof and fireproof.

C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.

D. The finished application shall withstand a 200-ampere arc for not less than 30 seconds.

E. Securing tape: Glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (3/4 inch) wide.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
   1. Comply with TIA/EIA-568-B.1.
   2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
   3. Install 110-style IDC termination hardware unless otherwise indicated.
   4. Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
   5. Cables shall not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
   7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
   8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
   9. Pulling Cable:
      a. Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
      b. Provide installation equipment that shall prevent the cutting or abrasion of insulation during pulling of cables.
      c. Use ropes made of nonmetallic material for pulling feeders.
      d. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the COR.
      e. Pull in multiple cables together in a single conduit.

C. Splice cables and wires where necessary only in outlet boxes, junction boxes, or pull boxes.
   1. Splices and terminations shall be mechanically and electrically secure.

2. Where the Government determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the Government.

D. Seal cable and wire entering a building from underground, between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.

E. Unless otherwise specified in other sections install wiring and connect to equipment/devices to perform the required functions as shown and specified.

F. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system shall not affect other systems.

G. Where separate power supply circuits are not shown, connect the systems to the nearest panel boards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.

H. Install a red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.

I. System voltages shall be 120 volts or lower where shown on the drawings or as required by the NEC.

J. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

K. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

L. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.

3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

M. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 72 inches (1830 mm)long shall be neatly coiled not less than 12 inches (300 mm) in diameter below each feed point.

N. Outdoor Coaxial Cable Installation:
1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

O. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.2 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in metal raceway according to Division 28 Section "CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY."
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:
   1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, shall not contain any other wire or cable.
   2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is not permitted.
   3. Signaling Line Circuits: Power-limited fire alarm cables shall not be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all

connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 CONTROL CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.4 CONNECTIONS

A. Comply with requirements in Division 28 Section "FIRE DETECTION AND ALARM" for connecting, terminating, and identifying wires and cables.

3.5 FIRESTOPPING

A. Comply with requirements in Division 07 Section "PENETRATION FIRESTOPPING."

B. Comply with TIA/EIA-569-A, "Firestopping" Annex A.

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low-voltage wiring and cabling, comply with requirements in Division 28 Section "GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY."

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.

B. Install a permanent wire marker on each wire at each termination.

C. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.

D. Wire markers shall retain their markings after cleaning.

E. In each handhole, install embossed brass tags to identify the system served and function.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a

guide or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling shall be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.9 EXISTING WIRING

A. Unless specifically indicated on the plans, existing wiring shall not be reused for the new installation. Only wiring that conforms to the specifications and applicable codes shall be reused. If existing wiring does not meet these requirements, existing wiring shall not be reused and new wires shall be installed.

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SECTION 28 05 26
GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the finishing, installation, connection, testing and certification of the grounding and bonding required for a fully functional Electronic Safety and Security (ESS) system.

B. "Grounding electrode system" refers to all electrodes required by NEC, as well as including made, supplementary, grounding electrodes.

C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.

1.3 SUBMITTALS

A. Submit in accordance with Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

B. Shop Drawings:

1. Clearly present enough information to determine compliance with drawings and specifications.
2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.

C. Test Reports: Provide certified test reports of ground resistance.

D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the COR:

1. Certification that the materials and installation are in accordance with the drawings and specifications.
2. Certification by the contractor that the complete installation has been properly installed and tested.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):

B1-07.....Standard Specification for Hard-Drawn Copper Wire

B3-07.....Standard Specification for Soft or Annealed Copper Wire

B8-04.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

81-1983.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

C2-07.....National Electrical Safety Code

D. National Fire Protection Association (NFPA):

70-18.....National Electrical Code (NEC)

99-2018.....Health Care Facilities

E. Underwriters Laboratories, Inc. (UL):

44-05 .....Thermoset-Insulated Wires and Cables

83-08 .....Thermoplastic-Insulated Wires and Cables

467-07 .....Grounding and Bonding Equipment

486A-486B-03 .....Wire Connectors

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes 25 mm² (4 AWG) and larger shall be permitted to be identified per NEC.

B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be ASTM B1 solid bare copper wire.

2.2 SPLICES AND TERMINATION COMPONENTS

A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).2.4 ground connections

B. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

C. Below Grade: Exothermic-welded type connectors.

D. Above Grade:

1. Bonding Jumpers: Compression-type connectors, using zinc-plated fasteners and external tooth lockwashers.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Ground Busbars: Two-hole compression type lugs, using tin-plated copper or copper alloy bolts and nuts.
4. Rack and Cabinet Ground Bars: One-hole compression-type lugs, using zinc-plated or copper alloy fasteners.
5. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
   a. Pipe Connectors: Clamp type, sized for pipe.
6. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 4 mm thick by 19 mm wide (3/8 inch x ¾ inch).

2.4 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.5 SPLICE CASE GROUND ACCESSORIES

A. Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use 16 mm² (6 AWG) insulated ground wire with shield bonding connectors.

PART 3 - EXECUTION

3.1 GENERAL

A. Ground in accordance with the NEC, as shown on drawings, and as specified herein.

B. System Grounding:

1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic structures, including ductwork and building steel, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 CORROSION INHIBITORS

A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.4 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.5 WIREWAY GROUNDING

A. Ground and Bond Metallic Wireway Systems as follows:

1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 16 mm² (6 AWG) bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated 16 mm² (6 AWG) bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 16 meters (50 feet).
3. Use insulated 16 mm² (6 AWG) bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.
4. Use insulated 16 mm² (6 AWG) bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 meters.

3.6 LABELING

A. Comply with requirements in Division 26 Section "ELECTRICAL IDENTIFICATION" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor.

1. Label Text: "If this connector or cable is loose or if it shall be removed for any reason, notify the facility manager."
2. All ground Busses shall be labeled “Main Ground Bus”, “Telecom Room Ground Bus.”
3. All grounding cabling shall be labeled, “Ground Cable Bonded from Main TGB,” “Ground Cable Bonded from the Main Electrical Ground Bus” “Ground Cable Bonded from Electrical Panel XXX”, “Ground Cable Bonded to the Building Steel.”

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
   2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
   3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal at individual ground rods. Make tests at ground rods before any conductors are connected.
      a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
      b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system shall be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:
   1. Power Distribution Units or Panel boards Serving Electronic Equipment: 3 ohm(s).
   2. Manhole Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

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SECTION 28 05 28.33
CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the finishing, installation, connection, testing certification of the conduit, fittings, and boxes to form a complete, coordinated, raceway system(s). Conduits and when approved separate UL Certified and Listed partitioned telecommunications raceways are required for a fully functional Electronic Safety and Security (ESS) system. Raceways are required for all electronic safety and security cabling unless shown or specified otherwise.

B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.

B. Section 07 84 00 - FIRESTOPPING. Requirements for sealing around penetrations to maintain the integrity of fire rated construction.

C. Section 09 91 00 - PAINTING. Requirements for identification and painting of conduit and other devices.

D. Section 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY. For general electrical requirements, general arrangement of the contract documents, coordination, quality assurance, project conditions, equipment and materials, and items that is common to more than one section of Division 28.

E. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FMC: Flexible metal conduit.

E. IMC: Intermediate metal conduit.

F. LFMC: Liquidtight flexible metal conduit.

G. LFNC: Liquidtight flexible nonmetallic conduit.

H. NBR: Acrylonitrile-butadiene rubber.

I. RNC: Rigid nonmetallic conduit.

1.4 QUALITY ASSURANCE

A. Refer to Paragraph 1.4 Quality Assurance, in Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

1.5 SUBMITTALS

A. Submit in accordance with Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Furnish the following:

B. Shop Drawings:

1. Size and location of main feeders;
2. Size and location of panels and pull boxes
3. Layout of required conduit penetrations through structural elements.
4. The specific items proposed and its area of application shall be identified on the catalog cuts.

C. Certification: Prior to final inspection, deliver to the Contracting Officer’s Representative (COR) four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

D. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

E. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.
2. Handholes and boxes for underground wiring, including the following:
   a. Duct entry provisions, including locations and duct sizes.
   b. Frame and cover design.
   c. Grounding details.
   d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
   e. Joint details.

F. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in the paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

G. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, shall withstand seismic forces defined in Division 16 Section "Electrical Supports and Seismic Restraints." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   a. The term "withstand" means "the cabinet or enclosure shall remain in place without separation of any parts when subjected to the seismic forces specified and the unit shall retain its enclosure characteristics, including its interior accessibility, after the seismic event."
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

H. Source quality-control test reports.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. National Electrical Manufacturers Association (NEMA):

TC-3-04	PVC Fittings for Use with Rigid PVC Conduit and Tubing
FB1-07	Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

C. National Fire Protection Association (NFPA):

70-18	National Electrical Code (NEC)

D. Underwriters Laboratories, Inc. (UL):

1-05	Flexible Metal Conduit
5-04	Surface Metal Raceway and Fittings
6-07	Rigid Metal Conduit
50-07	Enclosures for Electrical Equipment
360-09	Liquid-Tight Flexible Steel Conduit
467-07	Grounding and Bonding Equipment

514A-04	Metallic Outlet Boxes
514B-04	Fittings for Cable and Conduit
514C-02	Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-05	Schedule 40 and 80 Rigid PVC Conduit
651A-07	Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07	Electrical Metallic Tubing
1242-06	Intermediate Metal Conduit

PART 2 - PRODUCTS

2.1 GENERAL

A. Conduit Size: In accordance with the NEC, but not less than 20 mm (3/4 inch) unless otherwise shown.

2.2 CONDUIT

A. Rigid galvanized steel: Shall Conform to UL 6, ANSI C80.1.

B. Rigid intermediate steel conduit (IMC): Shall Conform to UL 1242, ANSI C80.6.

C. Electrical metallic tubing (EMT): Shall Conform to UL 797, ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 volts or less.

D. Flexible galvanized steel conduit: Shall Conform to UL 1.

E. Liquid-tight flexible metal conduit: Shall Conform to UL 360.

F. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high-density polyethylene (PE).

2.3 WIREWAYS AND RACEWAYS

A. Surface metal raceway: Shall Conform to UL 5.

2.4 CONDUIT FITTINGS

A. Rigid steel and IMC conduit fittings:

1. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
2. Standard threaded couplings, locknuts, bushings, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
3. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
4. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting.

Bushings made entirely of metal or nonmetallic material are not permitted.

5. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
6. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

B. Electrical metallic tubing fittings:
1. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
2. Only steel or malleable iron materials are acceptable.
3. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 50 mm (2 inches) and smaller. Use set screw type couplings with four set screws each for conduit sizes over 50 mm (2 inches). Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
4. Indent type connectors or couplings are prohibited.
5. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

C. Flexible steel conduit fittings:
1. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
2. Clamp type, with insulated throat.

D. Liquid-tight flexible metal conduit fittings:
1. Fittings shall meet the requirements of UL 514B and ANSI/ NEMA FB1.
2. Only steel or malleable iron materials are acceptable.
3. Fittings shall incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.

E. Surface metal raceway fittings: As recommended by the raceway manufacturer.

F. Expansion and deflection couplings:
   1. Conform to UL 467 and UL 514B.
   2. Accommodate, 19 mm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
   3. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
   4. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

2.5 CONDUIT SUPPORTS

A. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
B. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
C. Multiple conduit (trapeze) hangers: Not less than 38 mm by 38 mm (1-1/2 by 1-1/2 inch), 12 gage steel, cold formed, lipped channels; with not less than 9 mm (3/8 inch) diameter steel hanger rods.
D. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

2.6 OUTLET, JUNCTION, AND PULL BOXES

A. UL-50 and UL-514A.
B. Cast metal where required by the NEC or shown and equipped with rustproof boxes.
C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
D. Metal Floor Boxes: Cast or sheet metal, semi-adjustable, rectangular.
E. Sheet metal boxes: Galvanized steel, except where otherwise shown.
F. Flush mounted wall or ceiling boxes shall be installed with raised covers so that front face of raised cover is flush with the wall. Surface mounted wall or ceiling boxes shall be installed with surface style flat or raised covers.

2.7 CABINETS

A. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
B. Hinged door in front cover with flush latch and concealed hinge.
C. Key latch to match panelboards.

D. Metal barriers to separate wiring of different systems and voltage.

E. Accessory feet where required for freestanding equipment.

2.8 WIREWAYS

A. Equip with hinged covers, except where removable covers are shown.

2.9 SLEEVES FOR RACEWAYS

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Section 07 84 00 "FIRESTOPPING."

2.10 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.

1. Sealing Elements: Remarks: Remarks: [EPDM] [NBR] <Insert sealing element> interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Remarks: Remarks: [Plastic] [Carbon steel] [Stainless steel]. Include two for each sealing element.
3. Connecting Bolts and Nuts: [Carbon steel with corrosion-resistant coating] [Stainless steel] of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the COR prior to drilling through structural sections.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic

hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the COR as required by limited working space.

B. Fire Stop: Where conduits, wireways, and other electronic safety and security raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, "FIRESTOPPING", with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between raceways and openings with the fire stop material.

3.2 INSTALLATION, GENERAL

A. Install conduit as follows:

1. In complete runs before pulling in cables or wires.
2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
3. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
5. Mechanically continuous.
6. Independently support conduit at 2.4 m (8 foot) on center. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts).
7. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
9. Conduit installations under fume and vent hoods are prohibited.
10. Secure conduits to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
11. Do not use aluminum conduits in wet locations.
12. Unless otherwise indicated on the drawings or specified herein, all conduits shall be installed concealed within finished walls, floors and ceilings.

B. Conduit Bends:
   1. Make bends with standard conduit bending machines.
   2. Conduit hickey shall be used for slight offsets, and for straightening stubbed out conduits.
   3. Bending of conduits with a pipe tee or vise is prohibited.

C. Layout and Homeruns:
   1. Install conduit with wiring, including homeruns, as shown.
   2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the COR.

D. Fire Alarm:
   1. Fire alarm conduit shall be factory painted red (a red "top-coated" conduit from the conduit manufacturer shall be used in lieu of painted conduit) in accordance with the requirements of Section 28 31 00, "FIRE DETECTION AND ALARM".

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:
   1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.
   2. Align and run conduit in direct lines.
   3. Install conduit through concrete beams only when the following occurs:
      a. Where shown on the structural drawings.
      b. As approved by the COR prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
   4. Installation of conduit in concrete that is less than 75 mm (3 inch) thick is prohibited.
      a. Conduit outside diameter larger than 1/3 of the slab thickness is prohibited.
      b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
      c. Install conduits approximately in the center of the slab so that there shall be a minimum of 19 mm (3/4 inch) of concrete around the conduits.

5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the conduits. Tightening set screws with pliers is prohibited.

B. Furred or Suspended Ceilings and in Walls:
   1. Conduit for conductors above 600 volts:
      a. Rigid steel or rigid aluminum.
      b. Aluminum conduit mixed indiscriminately with other types in the same system is prohibited.
   2. Conduit for conductors 600 volts and below:
      a. Rigid steel, IMC, rigid aluminum, or EMT. Different type conduits mixed indiscriminately in the same system is prohibited.
   3. Align and run conduit parallel or perpendicular to the building lines.
   4. Connect recessed lighting fixtures to conduit runs with maximum 1800 Remarks: mm (6 feet) of flexible metal conduit extending from a junction box to the fixture.
   5. Tightening set screws with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.
B. Conduit for Conductors 600 volts and below:
   1. Rigid steel, IMC, or EMT. Different type of conduits mixed indiscriminately in the system is prohibited.
C. Align and run conduit parallel or perpendicular to the building lines.
D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
E. Support horizontal or vertical runs at not over 2400 mm (eight foot) intervals.
F. Surface metal raceways: Use only where shown.
G. Painting:
   1. Paint exposed conduit as specified in Section 09 91 00, “PAINTING”.
   2. Paint all conduits containing cables rated over 600 volts safety orange. Refer to Section 09 91 00, “PAINTING” for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (two inch) high black numerals and letters, showing the cable

voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6000 mm (20 foot) intervals in between.

3.5 EXPANSION JOINTS

A. Conduits 75 mm (3 inches) and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

B. Provide conduits smaller than 75 mm (3 inches) with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 125 mm (5 inch) vertical drop midway between the ends. Flexible conduit shall have a copper green ground bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for 375 mm (15 inches) and larger conduits are acceptable.

C. Install expansion and deflection couplings where shown.

3.6 CONDUIT SUPPORTS, INSTALLATION

A. Safe working load shall not exceed 1/4 of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 2.5 m (8 foot) on center.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 90 kg (200 pounds). Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Fasteners and Supports in Solid Masonry and Concrete:

1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
2. Existing Construction:
   a. Steel expansion anchors not less than 6 mm (1/4 inch) bolt size and not less than 28 mm (1-1/8 inch) embedment.
   b. Power set fasteners not less than 6 mm (1/4 inch) diameter with depth of penetration not less than 75 mm (3 inches).

c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.

F. Hollow Masonry: Toggle bolts are permitted.

G. Bolts supported only by plaster or gypsum wallboard are not acceptable.

H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

K. Spring steel type supports or fasteners are prohibited for all uses except: Horizontal and vertical supports/fasteners within walls.

L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.7 BOX INSTALLATION

A. Boxes for Concealed Conduits:
   1. Flush mounted.
   2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.

B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.

C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

D. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 600 mm (24 inch), center-to-center lateral spacing shall be maintained between boxes).

E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 100 mm (4 inches) square by 55 mm (2-1/8 inches) deep, with device covers for the wall material and thickness involved.

F. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example: "SIG-FA JB No. 1".

G. On all Branch Circuit junction box covers, identify the circuits with black marker.

3.8 ELECTRONIC SAFETY AND SECURITY CONDUIT

A. Install the electronic safety and security raceway system as shown on drawings.

B. Minimum conduit size of 19 mm (3/4 inch), but not less than the size shown on the drawings.

C. All conduit ends shall be equipped with insulated bushings.

D. All 100 mm (four inch) conduits within buildings shall include pull boxes after every two 90 degree bends. Size boxes per the NEC.

E. Vertical conduits/sleeves through closets floors shall terminate not less than 75 mm (3 inches) below the floor and not less than 75 mm (3 inches) below the ceiling of the floor below.

F. Terminate conduit runs to/from a backboard in a closet or interstitial space at the top or bottom of the backboard. Conduits shall enter communication closets next to the wall and be flush with the backboard.

G. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.

H. All empty conduits located in communications closets or on backboards shall be sealed with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.

I. Conduit runs shall contain no more than four quarter turns (90 degree bends) between pull boxes/backboards. Minimum radius of communication conduit bends shall be as follows (special long radius):

Sizes of Conduit Trade Size	Radius of Conduit Bends mm, Inches
¾	150 (6)
1	230 (9)
1-1/4	350 (14)
1-1/2	430 (17)
2	525 (21)
2-1/2	635 (25)
3	775 (31)
3-1/2	900 (36)
4	1125 (45)

J. Furnish and install 19 mm (3/4 inch) thick fire retardant plywood specified on the wall of communication closets where shown on drawings. Mount the plywood with the bottom edge 300 mm (one foot) above the finished floor.

K. Furnish and pull wire in all empty conduits. (Sleeves through floor are exceptions).

---END---

SECTION 28 08 00
COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 28.

B. This project shall have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIRMENTS. A Commissioning Agent (CxA) appointed by the VA shall manage the commissioning process.

1.2 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 SUMMARY

A. This Section includes requirements for commissioning the Facility electronic safety and security systems, related subsystems and related equipment. This Section supplements the general requirements specified in Section 01 91 00 General Commissioning Requirements.

B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

1.4 DEFINITIONS

A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

1.5 COMMISSIONED SYSTEMS

A. Commissioning of a system or systems specified in Division 28 is part of the construction process. Documentation and testing of these systems, as well as training of the VA’s Operation and Maintenance personnel in accordance with the requirements of Section 01 91 00 and of Division 28, is required in cooperation with the VA and the Commissioning Agent.

1.6 SUBMITTALS

A. The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.

B. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION INSPECTIONS

A. Commissioning of Electronic Safety and Security systems shall require inspection of individual elements of the electronic safety and security systems throughout the construction period. The Contractor shall coordinate with the Commissioning Agent in accordance with Section 01 91 00 and the Commissioning plan to schedule electronic safety and security systems inspections as required.

3.2 PRE-FUNCTIONAL CHECKLISTS

A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent shall prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent shall return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent shall select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment shall be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

3.3 CONTRACTORS TESTS

A. Contractor tests as required by other sections of Division 28 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent shall witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent shall prepare detailed Systems Functional Performance Test procedures for review and approval by the COR. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment to perform the tests. The Commissioning Agent shall witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

3.5 TRAINING OF VA PERSONNEL

A. Training of the VA operation and maintenance personnel is required in cooperation with the COR and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the requirements of Section 01 91 00.

B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 28 Sections for additional Contractor training requirements.

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SECTION 28 13 00
PHYSICAL ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the finishing, installation, connection, testing and certification of a complete and fully operating Physical Access Control System, hereinafter referred to as the PACS.

B. This Section includes a Physical Access Control System to match the existing PACS system consisting of a field-installed Controllers connected by a high-speed electronic data transmission network. The PACS shall have the following:

1. Physical Access Control:
   a. Regulating access through doors
   b. Surge and tamper protection
   c. Credential cards and readers
   d. Push-button switches
   e. RS-232 ASCII interface
   f. Interface with elevator control Reporting
   g. Keypad

C. System Architecture:

1. Criticality, operational requirements, and/or limiting points of failure may dictate the development of an enterprise and regional server architecture as opposed to system capacity. Provide server and workstation configurations with all necessary connectors, interfaces and accessories as shown.

D. PACS shall provide secure and reliable identification of Federal employees and contractors by utilizing credential authentication per FIPS-201.

E. Physical Access Control System (PACS) shall consist of:

1. Credential validation software/hardware,
2. Middleware
3. PIV Middleware,
4. Card readers,
5. PIV cards,
6. Supportive information system,
7. Door locks and sensors,
8. Power supplies,
9. Interfaces with:

a. Elevator Controls,

F. Head-End equipment server, workstations and controllers shall be connected by a high-speed electronic data transmission network.

G. Information system supporting PACS, Head-End equipment server, workstations, network switches, routers and controllers shall comply with FIPS 200 requirements (Minimum Security Requirements for Federal Information and Information Systems) and NIST Special Publication 800-53 (Recommended Security Controls for Federal Information Systems).

H. PACS system shall support:
   1. Multiple credential authentication modes,
   2. Bidirectional communication with the reader,
   3. Incident response policy implementation capability; system shall have capability to automatically change access privileges for certain user groups to high security areas in case of incident/emergency.

I. All security relevant decisions shall be made on "secure side of the door". Secure side processing shall include;
   1. Challenge/response management,
   2. PKI path discovery and validation,
   3. Credential identifier processing,
   4. Authorization decisions.

J. For locations where secure side processing is not applicable the tamper switches and certified cryptographic processing shall be provided per FIPS-140-2.

K. System Software: Based on <Insert name of operating system> central-station, workstation operating system, server operating system, and application software.

L. Software and controllers shall be capable of matching full 56 bit FASC-N plus minimum of 32 bits of public key certificate data.

M. Software shall have the following capabilities:
   1. Multiuser multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
   2. Support authentication and enrolment;
      a. PIV verification,
      b. Validate digital signatures of data objects (Objects are signed by the Trusted Authority

c. Private key challenge (CAK & PAK to verify private key public key pairs exist and card is not a clone)

3. Support CRL validation via OCSP or SCVP on a scheduled basis and automatically deny access to any revoked credential in the system.
4. Graphical user interface to show pull-down menus and a menu tree format that complies with interface guidelines of Microsoft Windows operating system.
5. System license shall be for the entire system and shall include capability for future additions that are within the indicated system size limits specified in this Section.

N. Systems Networks:

1. A standalone system network shall interconnect all components of the system. This network shall include communications between a central station and any peer or subordinate workstations, enrollment stations, local annunciation stations, portal control stations or redundant central stations.

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.
B. Section 07 84 00 - FIRESTOPPING. Requirements for firestopping application and use.
C. Section 08 71 00 - DOOR HARDWARE. Requirements for door installation.
D. Section 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS. Requirements for connection of high voltage.
E. Section 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW). Requirements for power cables.
F. Section 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS. Requirements for infrastructure.
G. Section 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY. For general requirements that are common to more than one section in Division 28.
H. Section 28 05 13 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for conductors and cables.
I. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for grounding of equipment.
J. Section 28 05 28.33 - CONDUITS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for infrastructure.

K. Section 28 23 00 - VIDEO SURVEILLANCE. Requirements for security camera systems.

L. Section 28 31 00 - FIRE DETECTION AND ALARM. Requirements for integration with fire detection and alarm system.

1.3 QUALITY ASSURANCE

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. The Contractor shall be responsible for providing, installing, and the operation of the PACS as shown. The Contractor shall also provide certification as required.

C. The security system will be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.

D. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

E. Product Qualifications:

1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.

F. Contractor Qualifications:

1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of three (3) years experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Security Management System’s (PACS) manufacturer. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as the proposed system. The references must include a current point of

contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system manufacturer certification for all technicians. The Contractor shall only utilize factory-trained technicians to install, program, and service the PACS. The Contractor shall only utilize factory-trained technicians to install, terminate and service controller/field panels and reader modules. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. The Contractor shall have a local service facility. The facility shall be located within 4 hours of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The COR reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.

a. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
b. Cable installer shall have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide consistent oversight of the project cabling throughout design, layout, installation, termination and testing.

G. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.4 SUBMITTALS

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. Submit below items in conjunction with Master Specification Sections 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, Section 02 41 00, DEMOLITION, and Section 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

C. Provide certificates of compliance with Section 1.3, Quality Assurance.

D. Provide a complete and thorough pre-installation and as-built design package in both electronic format and on paper, minimum size 48 x 48 inches (1220 x 1220 millimeters); drawing submittals shall be per the established project schedule.

E. Shop drawing and as-built packages shall include:

1. Index Sheet that shall:
   a. Define each page of the design package to include facility name, building name, floor, and sheet number.
   b. Provide a complete list of all security abbreviations and symbols.
   c. Reference all general notes that are utilized within the design package.
   d. Specification and scope of work pages for all individual security systems that are applicable to the design package that will:
      1) Outline all general and job specific work required within the design package.
      2) Provide a detailed device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
   a. Include a title block as defined above.
   b. Clearly define the drawings scale in both standard and metric measurements.
   c. Provide device identification and location.
   d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers).
   e. Identify all pull box and conduit locations, sizes, and fill capacities.
   f. Address all general and drawing specific notes for a particular drawing sheet.

3. A detailed riser drawing for each applicable security subsystem shall:
   a. Indicate the sequence of operation.
   b. Relationship of integrated components on one diagram.
   c. Include the number, size, identification, and maximum lengths of interconnecting wires.
   d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
4. A detailed system drawing for each applicable security system shall:
   a. Clearly identify how all equipment within the system, from main panel to device, shall be laid out and connected.
   b. Provide full detail of all system components wiring from point-to-point.
   c. Identify wire types utilized for connection, interconnection with associate security subsystems.
   d. Show device locations that correspond to the floor plans.
   e. All general and drawing specific notes shall be included with the system drawings.
5. A detailed schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
   a. Device ID.
   b. Device Location (e.g. site, building, floor, room number, location, and description).
   c. Mounting type (e.g. flush, wall, surface).
   d. Power supply or circuit breaker and power panel number.
   e. In addition, for the PACS, provide the door ID, door type (e.g. wood or metal), locking mechanism (e.g. strike or electromagnetic lock) and control device (e.g. card reader or biometrics).
6. Detail and elevation drawings for all devices that define how they were installed and mounted.

F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a

Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.

G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per Section 01 00 00, GENERAL REQUIREMENTS, and Section 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

H. General: Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. Additional general provisions are as follows:

1. The Contractor shall schedule submittals in order to maintain the project schedule. For coordination drawings refer to Specification Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES , which outline basic submittal requirements and coordination.
2. The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.
3. Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware) which are required to produce an accurate and detailed depiction of the project.
4. Manufacturer's information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for COR and Contractor review stamps.
5. Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with VA CAD Standards. FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED. The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data

Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the COR for approval before the initiation of work.

6. Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
   a. Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
      1) Where two (2) or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and or maintenance of the component or system.
      2) Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume number if applicable.
   b. Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.
   c. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
   d. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches 20 pound white bond paper.
   e. Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.
      1) Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.
      2) If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket

of the binder. Insert a type written page indicating the drawing title, description of contents and drawing location at the appropriate location of the manual.

3) Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16” tall.

f. Manual Content: In each manual include information specified in the individual Specification section, and the following information for each major component of building equipment and controls:
   1) General system or equipment description.
   2) Design factors and assumptions.
   3) Copies of applicable Shop Drawings and Product Data.
   4) System or equipment identification including: manufacturer, model and serial numbers of each component, operating instructions, emergency instructions, wiring diagrams, inspection and test procedures, maintenance procedures and schedules, precautions against improper use and maintenance, repair instructions, sources of required maintenance materials and related services, and a manual index.

g. Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer to Group I through V Technical Data Package Submittal requirements for required section content.

h. Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.

i. Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume.

Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

j. General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.

k. Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems, or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.

l. Manufacturer’s Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.

m. Where manufacturer's standard printed data is not available and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.

n. Calculations: Provide a section for circuit and panel calculations.

o. Loading Sheets: Provide a section for DGP Loading Sheets.

p. Certifications: Provide section for Contractor's manufacturer certifications.

7. Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer's catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.
8. Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.
9. Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.

I. FIPS 201 Compliance Certificates

1. Provide Certificates for all software components and device types utilizing credential verification. Provide certificates for:
   a. Card Readers
   b. PIV Middelware
   c. Template Matcher

J. Approvals will be based on complete submission of manuals together with shop drawings.

1.5 APPLICABLE PUBLICATIONS

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to

the extent referenced. The publications are referenced in the text by the basic designation only.

C. American National Standards Institute (ANSI)/ Security Industry Association (SIA):

AC-03.....Access Control: Access Control Guideline Dye Sublimation Printing Practices for PVC Access Control Cards

TVAC-01.....CCTV to Access Control Standard - Message Set for System Integration

D. American National Standards Institute (ANSI)/ International Code Council (ICC):

A117.1.....Standard on Accessible and Usable Buildings and Facilities

E. Department of Justice American Disability Act (ADA)

28 CFR Part 36.....ADA Standards for Accessible Design 2010

F. Department of Veterans Affairs (VA):

G. PACS-R: Physical Access Control System (PACS) Requirements

H. VA Handbook 0730 Security and Law Enforcement

I. Government Accountability Office (GAO):

J. GAO-03-8-02 Security Responsibilities for Federally Owned and Leased Facilities

K. National Electrical Contractors Association

303-2005.....Installing Closed Circuit Television (CCTV) Systems

L. National Electrical Manufactures Association (NEMA):

250-08.....Enclosures for Electrical Equipment (1000 Volts Maximum)

M. National Fire Protection Association (NFPA):

70-2017..... National Electrical Code

N. Underwriters Laboratories, Inc. (UL):

294-99.....The Standard of Safety for Access Control System Units

305-08.....Standard for Panic Hardware

639-97.....Standard for Intrusion-Detection Units

752-05.....Standard for Bullet-Resisting Equipment

827-08.....Central Station Alarm Services

1076-95.....Standards for Proprietary Burglar Alarm Units and Systems

1981-03.....Central Station Automation System

2058-05.....High Security Electronic Locks

O. Homeland Security Presidential Directive (HSPD):

HSPD-12.....Policy for a Common Identification Standard for Federal Employees and Contractors

P. Federal Communications Commission (FCC):

Q. (47 CFR 15) Part 15 Limitations on the Use of Wireless Equipment/Systems

R. Federal Information Processing Standards (FIPS):

FIPS-201-1.....Personal Identity Verification (PIV) of Federal Employees and Contractors

S. National Institute of Standards and Technology (NIST):

IR 6887 V2.1.....Government Smart Card Interoperability Specification (GSC-IS)

Special Pub 800-63.....Electronic Authentication Guideline

Special Pub 800-96.....PIV Card Reader Interoperability Guidelines

Special Pub 800-73-3....Interfaces for Personal Identity Verification (4 Parts)
Pt. 1- End Point PIV Card Application Namespace, Data Model & Representation
Pt. 2- PIV Card Application Card Command Interface
Pt. 3- PIV Client Application Programming Interface
Pt. 4- The PIV Transitional Interfaces & Data Model Specification

Special Pub 800-76-1....Biometric Data Specification for Personal Identity Verification

Special Pub 800-78-2....Cryptographic Algorithms and Key Sizes for Personal Identity Verification

Special Pub 800-79-1....Guidelines for the Accreditation of Personal Identity Verification Card Issuers

Special Pub 800-85B-1...DRAFTPIV Data Model Test Guidelines

Special Pub 800-85A-2...PIV Card Application and Middleware Interface Test Guidelines (SP 800-73-3 compliance)

Special Pub 800-96.....PIV Card Reader Interoperability Guidelines
Special Pub 800-37.....Guide for Applying the Risk Management Framework to Federal Information Systems
Special Pub 800-96.....PIV Card Reader Interoperability Guidelines
Special Pub 800-96.....PIV Card Reader Interoperability Guidelines
Special Pub 800-104A....Scheme for PIV Visual Card Topography
Special Pub 800-116.....Recommendation for the Use of PIV Credentials in Physical Access Control Systems (PACS)

T. Institute of Electrical and Electronics Engineers (IEEE):
C62.41.....IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

U. International Organization for Standardization (ISO):
7810.....Identification cards – Physical characteristics
7811.....Physical Characteristics for Magnetic Stripe Cards
7816-1.....Identification cards - Integrated circuit(s) cards with contacts - Part 1: Physical characteristics
7816-2.....Identification cards - Integrated circuit cards - Part 2: Cards with contacts -Dimensions and location of the contacts
7816-3.....Identification cards - Integrated circuit cards - Part 3: Cards with contacts - Electrical interface and transmission protocols
7816-4.....Identification cards - Integrated circuit cards - Part 11: Personal verification through biometric methods
7816-10.....Identification cards - Integrated circuit cards - Part 4: Organization, security and commands for interchange
14443.....Identification cards - Contactless integrated circuit cards; Contactless Proximity Cards Operating at 13.56 MHz in up to 5 inches distance
15693.....Identification cards -- Contactless integrated circuit cards - Vicinity cards; Contactless

Vicinity Cards Operating at 13.56 MHz in up to 50 inches distance

19794.....Information technology - Biometric data interchange formats

V. Uniform Federal Accessibility Standards (UFAS) 1984

W. ADA Standards for Accessible Design 2010

X. Section 508 of the Rehabilitation Act of 1973

1.6 DEFINITIONS

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. ABA Track: Magnetic stripe that is encoded on track 2, at 75-bpi density in binary-coded decimal format; for example, 5-bit, 16-character set.

C. Access Control List: A list of (identifier, permissions) pairs associated with a resource or an asset. As an expression of security policy, a person may perform an operation on a resource or asset if and only if the person’s identifier is present in the access control list (explicitly or implicitly), and the permissions in the (identifier, permissions) pair include the permission to perform the requested operation.

D. Access Control: A function or a system that restricts access to authorized persons only.

E. API Application Programming Interface

F. Assurance Level (or E-Authentication Assurance Level): A measure of trust or confidence in an authentication mechanism defined in OMB Memorandum M-04-04 and NIST Special Publication (SP) 800-63, in terms of four levels: [M-04-04]

1. Level 1: LITTLE OR NO confidence
2. Level 2: SOME confidence
3. Level 3: HIGH confidence
4. Level 4: VERY HIGH confidence

G. Authentication: A process that establishes the origin of information, or determines an entity’s identity. In this publication, authentication often means the performance of a PIV authentication mechanism.

H. Authenticator: A memory, possession, or quality of a person that can serve as proof of identity, when presented to a verifier of the

appropriate kind. For example, passwords, cryptographic keys, and fingerprints are authenticators.

I. Authorization: A process that associates permission to access a resource or asset with a person and the person's identifier(s).

J. BIO or BIO-A: A FIPS 201 authentication mechanism that is implemented by using a Fingerprint data object sent from the PIV Card to the PACS. Note that the short-hand "BIO (-A)" is used throughout the document to represent both BIO and BIO-A authentication mechanisms.

K. Biometric: An authenticator produced from measurable qualities of a living person.

L. CAC EP – CAC End Point with end point PIV applet

M. CAC NG – CAC Next Generation with transitional PIV applet

N. Card Authentication Key (CAK): A PIV authentication mechanism (or the PIV Card key of the same name) that is implemented by an asymmetric or symmetric key challenge/response protocol. The CAK is an optional mechanism defined in NIST SP 800-73. [SP800-73] NIST strongly recommends that every PIV Card contain an asymmetric CAK and corresponding certificate, and that agencies use the asymmetric CAK protocol, rather than a symmetric CAK protocol, whenever the CAK authentication mechanism is used with PACS.

O. CCTV: Closed-circuit television.

P. Central Station: A PC with software designated as the main controlling PC of the PACS. Where this term is presented with initial capital letters, this definition applies.

Q. Controller: An intelligent peripheral control unit that uses a computer for controlling its operation. Where this term is presented with an initial capital letter, this definition applies.

R. CPU: Central processing unit.

S. Credential: Data assigned to an entity and used to identify that entity.

T. File Server: A PC in a network that stores the programs and data files shared by users.

U. FIPS Federal Information Processing Standards

V. FRAC – First Responder Authentication Credential

W. HSPD Homeland Security Presidential Directive

X. I/O: Input/Output.

Y. Identifier: A credential card, keypad personal identification number or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

Z. IEC International Electrotechnical Commission

AA. ISO International Organization for Standardization

BB. KB Kilobyte

CC. kbit/s Kilobits / second

DD. LAN: Local area network.

EE. LED: Light-emitting diode.

FF. Legacy CAC – Contact only Common Access Card with v1 and v2 applets

GG. Location: A Location on the network having a PC-to-Controller communications link, with additional Controllers at the Location connected to the PC-to-Controller link with RS-485 communications loop. Where this term is presented with an initial capital letter, this definition applies.

HH. NIST: National Institute of Standards and Technology

II. PACS: Physical Access Control System

JJ. PC/SC: Personal Computer / Smart Card

KK. PC: Personal computer. This acronym applies to the Central Station, workstations, and file servers.

LL. PCI Bus: Peripheral component interconnect; a peripheral bus providing a high-speed data path between the CPU and peripheral devices (such as monitor, disk drive, or network).

MM. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.

NN. PIV: Personal Identification Verification

OO. PIV-I – PIV Interoperable credential

PP. PPS: Protocol and Parameters Selection

QQ. RF: Radio frequency.

RR. ROM: Read-only memory. ROM data are maintained through losses of power.

SS. RS-232: An TIA/EIA standard for asynchronous serial data communications between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.

TT. RS-485: An TIA/EIA standard for multipoint communications.

UU. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

VV. TPDU: Transport Protocol Data Unit

WW. TWIC – Transportation Worker Identification Credential

XX. UPS: Uninterruptible power supply.

YY. Vcc: Voltage at the Common Collector

ZZ. WAN: Wide area network.

AAA. WAV: The digital audio format used in Microsoft Windows.

BBB. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

CCC. Windows: Operating system by Microsoft Corporation.

DDD. Workstation: A PC with software that is configured for specific limited security system functions.

1.7 COORDINATION

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. Coordinate arrangement, mounting, and support of electronic safety and security equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

C. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

D. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed.

1.8 MAINTENANCE & SERVICE

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. General Requirements

1. The Contractor shall provide all services required and equipment necessary to maintain the entire integrated electronic security system in an operational state as specified for a period of one (1) year after formal written acceptance of the system. The Contractor shall provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. See also General Project Requirements.
2. The Contractor shall repair any piece of equipment during the product warranty period.

1.9 PERFORMANCE REQUIREMENTS

A. PACS shall provide support for multiple authentication modes and bidirectional communication with the reader. PACS shall provide implementation capability for enterprise security policy and incident response.

B. All processing of authentication information must occur on the "safe side" of a door

C. PACS shall provide:

1. One authentication factor for access to Controlled security areas
2. Two authentication factors for access to Limited security areas
3. Three authentication factors for access to Exclusion security areas

D. PACS shall provide Credential Validation and Path Validation per NIST 800-116.

E. Distributed Processing: System shall be a fully distributed processing system so that information, including time, date, valid codes, access levels, and similar data, is downloaded to Controllers so that each Controller makes access-control decisions for that Location. Do not use intermediate Controllers for physical access control. If communications to Central Station are lost, all Controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the Central Station.

F. Number of Locations: Support unlimited number of separate Locations using a single PC with combinations of direct-connect, dial-up, or TCP/IP LAN connections to each Location.

1. Each Location shall have its own database and history in the Central Station. Locations may be combined to share a common database.

1.10 EQUIPMENT AND MATERIALS

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY, Part 1

B. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

C. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.

D. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

E. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

F. When Factory Testing Is Specified:

1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the COR a minimum of 15 working days prior to the manufacturers making the factory tests.
2. Four copies of certified test reports containing all test data shall be furnished to the COR prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.11 WARRANTY OF CONSTRUCTION.

A. Warrant PACS work subject to the Article “Warranty of Construction” of FAR clause 52.246-21.

B. Demonstration and training shall be performed prior to system acceptance.

1.12 GENERAL REQUIREMENTS

A. For general requirements that are common to more than one section in Division 28 refer to Section 28 05 00, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS.

B. General requirements applicable to this section include:

1. General Arrangement of Contract Documents
2. Delivery, Handling and Storage
3. Project Conditions
4. Electrical Power
5. Lightning, Power Surge Suppression, and Grounding
6. Electronic Components
7. Substitute Materials and Equipment
8. Like Items.

PART 2 - PRODUCTS

2.1 GENERAL

A. All equipment and materials for the system will be compatible to ensure correct operation as outlined in FIPS 201, March 2006 and HSPD-12.

B. The security system characteristics listed in this section will serve as a guide in selection of equipment and materials for the PACS. If updated or more suitable versions are available then the Contracting Officer shall approve the acceptance of prior to an installation.

C. PACS equipment shall meet or exceed all requirements listed below.

D. A PACS shall be comprised of the following components:

1. Physical Access Control System
2. Application Software
3. Surge and Tamper Protection
4. Controllers (Data Gathering Panel)
5. Keypads
6. Card Readers
7. System Sensors and Related Equipment
8. Push Button Switches
9. Interfaces
10. Door and Gate Hardware interface
11. RS-232 ASCII Interface
12. Floor Select Elevator Control
13. Cables

14. Transformers

2.2 SECURITY MANAGEMENT SYSTEM (SMS)

A. Match existing PACS system.

2.3 SURGE AND TAMPER PROTECTION

A. Refer to 28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.4 DOOR CONTROLLERS

A. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the Central Station or workstation for controlling its operation.

B. Subject to compliance with requirements in this Article, manufacturers shall use multipurpose Controllers.

C. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.

D. Alarm Annunciation Controller:

1. The Controller shall automatically restore communication within 10 seconds after an interruption with the field device network with dc line supervision on each of its alarm inputs.
   a. Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
   b. Alarm-Line Supervision:
      1) Supervise the alarm lines by monitoring each circuit for changes or disturbances in the signal, and for conditions as described in UL 1076 for line security equipment OR by monitoring for abnormal open, grounded, or shorted conditions using dc change measurements. System shall initiate an alarm in response to an abnormal current, which is a dc change of 10 percent or more for longer than 500 ms.
      2) Transmit alarm-line-supervision alarm to the Central Station during the next interrogation cycle after the abnormal current condition.
   c. Outputs: Managed by Central Station software.
2. Auxiliary Equipment Power: A GFI service outlet inside the Controller enclosure.

E. Entry-Control Controller:
1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, biometric personal identity verification devices, door strikes, magnetic latches, gate and door operators, and exit push-buttons.
   a. Operate as a stand-alone portal Controller using the downloaded database during periods of communication loss between the Controller and the field-device network.
   b. Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:
      1) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.

2) Privileges shall include, time of day control, day of week control, group control, and visitor escort control.

c. Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2. Inputs:
   a. Data from entry-control devices; use this input to change modes between access and secure.
   b. Database downloads and updates from the Central Station that include enrollment and privilege information.
3. Outputs:
   a. Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
   b. Grant or deny entry by sending control signals to portal-control devices and mask intrusion alarm annunciation from sensors stimulated by authorized entries.
   c. Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the Central Station.
   d. Door Prop Alarm: If a portal is held open for longer than 20 seconds time listed in a schedule, alarm sounds.
4. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
5. Data Line Problems: For periods of loss of communications with Central Station, or when data transmission is degraded and generating continuous checksum errors, the Controller shall continue to control entry by accepting identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.
   a. Store up to 1000 transactions during periods of communication loss between the Controller and access-control devices for subsequent upload to the Central Station on restoration of communication.

6. Controller Power: NFPA 70, Class II power supply transformer, with 12- or 24-V ac secondary, backup battery and charger.
   a. Backup Battery: Premium, valve-regulated, recombinant-sealed, lead-calcium battery; spill proof; with a full 1-year warranty and a pro rata 19-year warranty. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   b. Backup Battery: Valve-regulated, recombinant-sealed, lead-acid battery; spill proof. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   c. Backup Power Supply Capacity: 90 minutes of battery supply. Submit battery and charger calculations.
   d. Power Monitoring: Provide manual dynamic battery load test, initiated and monitored at the control center; with automatic disconnection of the Controller when battery voltage drops below Controller limits. Report by using local Controller-mounted LEDs and by communicating status to Central Station. Indicate normal power on and battery charger on trickle charge. Indicate and report the following:
      1) Trouble Alarm: Normal power off load assumed by battery.
      2) Trouble Alarm: Low battery.
      3) Alarm: Power off.

2.5 PIV MIDDLEWARE

A. PIV Middleware shall match the existing.

2.6 CARD READERS

A. Power: Card reader shall be powered from its associated Controller, including its standby power source.

B. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the Controller. Response time shall be 800ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.

C. Enclosure: Suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.
3. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

D. Display: LED or other type of visual indicator display shall provide visual and audible status indications and user prompts. Indicate power on/off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.

E. Shall be utilized for controlling the locking hardware on a door and allows for reporting back to the main control panel with the time/date the door was accessed, the name of the person accessing the point of entry, and its location.

F. Shall be fully programmable and addressable, locally and remotely, and hardwired to the system.

G. Shall be individually home run to the main panel.

H. Shall be installed in a manner that they comply with:
1. The Uniform Federal Accessibility Standards (UFAS)
2. The Americans with Disabilities Act (ADA)
3. The ADA Standards for Accessible Design

I. Shall support a variety of card readers that shall encompass a wide functional range. The PACS shall combine any of the card readers described below for installations requiring multiple types of card reader capability (i.e., card only, card and/or PIN, card and/or biometrics, card and/or pin and/or biometrics, supervised inputs). These card readers shall be available in the approved technology to meet FIPS 201, and is ISO 14443 A or B, ISO/IEC 7816 compliant. The reader output can be Wiegand, RS-22, 485 or TCP/IP.

J. Shall be housed in an aluminum bezel with a wide lead-in for easy card entry.

K. Shall contain read head electronics, and a sender to encode digital door control signals.

L. LED’s shall be utilized to indicate card reader status and access status.

M. Shall be able to support a user defined downloadable off-line mode of operation (e.g. locked, unlocked), which shall go in effect during loss of communication with the main control panel.

N. Shall provide audible feedback to indicate access granted/denied decisions. Upon a card swipe, two audible tones or beeps shall indicate access granted and three tones or beeps shall indicate access denied. All keypad buttons shall provide tactile audible feedback.

O. Shall have a minimum of two programmable inputs and two programmable outputs.

P. All card readers that utilize keypad controls along with a reader and shall meet the following specifications:

1. Entry control keypads shall use a unique combination of alphanumeric and other symbols as an identifier. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII code ordinal sequence. Communications protocol shall be compatible with the local processor.

Q. Shall include a Light Emitting Diode (LED) or other type of visual indicator display and provide visual or visual and audible status indications and user prompts. The display shall indicate power on/off, and whether user passage requests have been accepted or rejected. The design of the keypad display or keypad enclosure shall limit the maximum horizontal and vertical viewing angles of the keypad. The maximum horizontal viewing angle shall be plus and minus five (5) degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display. The maximum vertical viewing angle shall be plus and minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.

1. Shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 milliseconds or less from the time the last alphanumeric symbol is entered until a response signal is generated.
2. Shall be powered from the source as designed and shall not dissipate more than 150 Watts.
3. Shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.
4. Shall provide a means for users to indicate a duress situation by entering a special code.

R. PIV Contact Card Reader

1. Application Protocol Data Unit (APDU) Support: At a minimum, the contact interface shall support all card commands for contact based

access specified in Section 7, End-point PIV Card Application Card Command Interface of SP 800-73-1, Interfaces for Personal Identity Verification.

2. Buffer Size: The reader shall contain a buffer large enough to receive the maximum size frame permitted by International Organization for Standardization International Electrotechnical Commission (ISO/IEC) 7816-3:1997, Section 9.4.
3. Programming Voltage: PIV Readers shall not generate a Programming Voltage.
4. Support for Operating Class: PIV Readers shall support cards with Class A Vccs as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.
5. Retrieval Time: Retrieval time for 12.5 kilobytes (KB) of data through the contact interface of the reader shall not exceed 2.0 seconds.
6. Transmission Protocol: The PIV Reader shall support both the character-based T=0 protocol and block-based T=1 protocol as defined in ISO/IEC 7816-3:1997.
7. Support for PPS Procedure: The reader shall support Protocol and Parameters Selection (PPS) procedure by having the ability to read character TA1 of the Answer to Reset (ATR) sent by the card as defined in ISO/IEC 7816-3:1997.

S. Contactless Smart Cards and Readers

1. Smart card readers shall read credential cards whose characteristics of size and technology meet those defined by ISO/IEC 7816, 14443, 15693.
2. The readers shall have "flash" download capability to accommodate card format changes.
3. The card reader shall have the capability of reading the card data and transmitting the data to the main monitoring panel.
4. The card reader shall be contactless and meet or exceed the following technical characteristics:
   a. Data Output Formats: FIPS 201 low outputs the FASC-N in an assortment of Wiegand bit formats from 40 – 200 bits. FIPS 201 medium outputs a combination FASC-N and HMAC in an assortment of Wiegand bit formats from 32 – 232 bits. All Wiegand formats or

the upgradeability from Low to Medium Levels can be field configured with the use of a command card.

b. FIPS 201 readers shall be able to read, DESfire and iCLASS cards.
c. Reader range shall comply with ISO standards 7816, 14443, and 15693, and also take into consideration conditions, are at a minimum 1” to 2” (2.5 – 5 cm).
d. APDU Support: At a minimum, the contactless interface shall support all card commands for contactless based access specified in Section 7, End-point PIV Card Application Card Command Interface of SP 800-73-1, Interfaces for Personal Identity Verification.
e. Buffer Size: The reader shall contain a buffer large enough to receive the maximum size frame permitted by ISO/IEC 7816-3, Section 9.4.
f. ISO 14443 Support: The PIV Reader shall support parts (1 through 4) of ISO/IEC 14443 as amended in the References of this publication.
g. Type A and B Communication Signal Interfaces: The contactless interface of the reader shall support both the Type A and Type B communication signal interfaces as defined in ISO/IEC 14443-2:2001.
h. Type A and B Initialization and Anti-Collision The contactless interface of the reader shall support both Type A and Type B initialization and anti-collision methods as defined in ISO/IEC 14443-3:2001.
i. Type A and B Transmission Protocols: The contactless interface of the reader shall support both Type A and Type B transmission protocols as defined in ISO/IEC 14443-4:2001.
j. Retrieval Time: Retrieval time for 4 KB of data through the contactless interface of the reader shall not exceed 2.0 seconds.
k. Transmission Speeds: The contactless interface of the reader shall support bit rates of fc/128 (~106 kbits/s), fc/64(~212 kbits/s), and configurable to allow activation/deactivation.
l. Readability Range: The reader shall not be able to read PIV card more than 10cm(4inch) from the reader

2.7 KEYPADS

A. Designed for use with unique combinations of alphanumeric and other symbols as an Identifier. Keys of keypads shall contain an integral alphanumeric/special symbol keyboard with symbols arranged in ascending ASCII-code ordinal sequence/random scrambled order. Communications protocol shall be compatible with Controller.

1. Keypad display or enclosure shall limit viewing angles of the keypad as follows:
   a. Maximum Horizontal Viewing Angle: 5 degrees or less off in either direction of a vertical plane perpendicular to the plane of the face of the keypad display.
   b. Maximum Vertical Viewing Angle: 15 degrees or less off in either direction of a horizontal plane perpendicular to the plane of the face of the keypad display.
2. Duress Codes: Provide duress situation indication by entering a special code.

2.8 SYSTEM SENSORS AND RELATED EQUIPMENT

A. The PACS (Physical Access Control System) and related Equipment provided by the Contractor shall meet or exceed the following performer specifications:

B. Request to Exit Detectors:

1. Passive Infrared Request to Exit Motion Detector (REX PIR) (1) The Contractor shall provide a surface mounted motion detector to signal the physical access control system request to exit input. The motion detector shall be a passive infrared sensor designed for wall or ceiling mounting 2134 to 4572 mm (7 to 15 ft) height. The detector shall provide two (2) form "C" (SPDT) relays rated one (1) Amp. @ 30 VDC for DC resistive loads. The detectors relays shall be user adjustable with a latch time from 1-60 seconds. The detector shall also include a selectable relay reset mode to follow the timer or absence of motion. The detection pattern shall be adjustable plus or minus fourteen (± 14) degrees. The detector shall operate on 12 VDC with approximately 26 mA continuous current draw. The detector shall have an externally visible activation LED. The motion detector shall measure approximately 38 mm H x 158 mm W x 38 mm D (1.5 x 6.25 x 1.5 in). The detector shall be immune to radio frequency interference. The detector shall not activate or set-up

on critical frequencies in the range 26 to 950 Megahertz using a 50 watt transmitter located 30.5 cm (1 ft) from the unit or attached wiring. The detector shall be available on gray or black enclosures. The color of the housing shall be coordinated with the surrounding surface.

C. Crash Bar:

1. Emergency Exit with Alarm (Panic):
   a. Entry control portals shall include panic bar emergency exit hardware as designed.
   b. Panic bar emergency exit hardware shall provide an alarm shunt signal to the PACS and SMS.
   c. The panic bar shall include a conspicuous warning sign with one (1) inch (2.5 cm) high, red lettering notifying personnel that an alarm shall be annunciated if the panic bar is operated.
   d. Operation of the panic bar hardware shall generate an intrusion alarm that reports to both the SMS and Intrusion Detection System. The use of a micro switch installed within the panic bar shall be utilized for this.
   e. The panic bar shall utilize a fully mechanical connection only and shall not depend upon electric power for operation.
   f. The panic bar shall be compatible with mortise or rim mount door hardware and shall operate by retracting the bolt manually by either pressing the panic bar or with a key by-pass. Refer to Section 2.2.I.9 for key-bypass specifications.
   g. Normal Exit:
      1) Entry control portals shall include panic bar non-emergency exit hardware as designed.
      2) Panic bar non-emergency exit hardware shall be monitored by and report to the SMS.
      3) Operation of the panic bar hardware shall not generate a locally audible or an intrusion alarm within the PACS.
      4) When exiting, the panic bar shall depend upon a mechanical connection only. The exterior, non-secure side of the door shall be provided with an electrified thumb latch or lever to provide access after the credential I.D. authentication by the SMS.

5) The panic bar shall be compatible with mortise or rim mount door hardware and shall operate by retracting the bolt manually by either pressing the panic bar or with a key by-pass. Refer to Section 2.2.I.9 for key-bypass specifications. The strikes/bolts shall include a micro switch to indicate to the system when the bolt is not engaged or the strike mechanism is unlocked. The signal switches shall report a forced entry to the system in the event the door is left open or accessed without the identification credentials.

D. Key Bypass:
   1. Shall be utilized for all doors that have a mortise or rim mounted door hardware.
   2. Each door shall be individually keyed with one master key per secured area.
   3. Cylinders shall be six (6)-pin and made of brass or equivalent. Keys for the cylinders shall be constructed of solid material and produced and cut by the same distributor. Keys shall not be purchased, cut, and supplied by multiple dealers.
   4. All keys shall have a serial number cut into the key. No two serial numbers shall be the same.
   5. All keys and cylinders shall be stored in a secure area that is monitored by the Intrusion Detection System.

E. Door Status Indicators:
   1. Shall monitor and report door status to the SMS.
   2. Door Position Sensor:
      a. Shall provide an open or closed indication for all doors operated on the PACS and report directly to the SMS.
      b. Shall also provide alarm input to the Intrusion Detection System for all doors operated by the PACS and all other doors that require monitoring by the intrusion detection system.
      c. Switches for doors operated by the PACS shall be double pole double throw (DPDT). One side of the switch shall monitor door position and the other side if the switch shall report to the intrusion detection system. For doors with electromagnetic locks a magnetic bonding sensor (MBS) can be used in place of one side of a DPDT switch, in turn allowing for the use of a single pole double throw (SPDT) switch in it place of a DPDT switch.

d. Switches for doors not operated by the PACS shall be SPDT and report directly to the PACS.
e. Shall be surface or flush mounted and wide gap with the ability to operate at a maximum distance of up to 2” (5 cm).

2.9 PUSH BUTTON SWITCHES

A. Push-Button Switches: Momentary-contact back-lighted push buttons, with stainless-steel switch enclosures.
1. Electrical Ratings:
a. Minimum continuous current rating of 10 A at 120 V ac or 5 A at 240-V ac.
b. Contacts that shall make 720 VA at 60 A and that shall break at 720 VA at 10 A.
2. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.
3. Enclosures shall additionally be suitable for installation in the following locations:
a. Indoors, controlled environment.
b. Indoors, uncontrolled environment.
c. Outdoors.
4. Power: Push-button switches shall be powered from their associated Controller, using dc control.

2.10 PORTAL CONTROL DEVICES

A. Shall be used to assist the PACS.
B. Such devices shall:
1. Provide a means of monitoring the doors status.
2. Allow for exiting a space via either a push button, request to exit, or panic/crash bar.
3. Provide a means of override to the PACS via a keypad or key bypass.
4. Assist door operations utilizing automatic openers and closures.
5. Provide a secondary means of access to a space via a keypad.
C. Shall be connected to and monitored by the main PACS panel.
D. Shall be installed in a manner that they comply with:
1. The Uniform Federal Accessibility Standards (UFAS)
2. The Americans with Disabilities Act (ADA)
3. The ADA Standards for Accessible Design
E. Shall provide a secondary means of physical access control within a secure area.

F. Push-Button Switches:
   1. Shall be momentary contact, back lighted push buttons, and stainless steel switch enclosures for each push button as shown. Buttons shall be utilized for secondary means of releasing a locking mechanism.
      a. In an area where a push button is being utilized for remote access of the locking device then no more than two (2) buttons shall operate one door from within one secure space. Buttons shall not be wired in series with one other.
      b. In an area where locally stationed guards control entry to multiple secure points via remote switches. An interface board shall be designed and constructed for only the amount of buttons it shall house. These buttons shall be flush mounted and clearly labeled for ease of use. All buttons shall be connected to the PACS and SMS system for monitoring purposes.
      c. Shall have double-break silver contacts that shall make 720 VA at 60 amperes and break 720 VA at 10 amperes.

G. Entry Control Devices:
   1. Shall be hardwired to the PACS main control panel and operated by either a card reader or a biometric device via a relay on the main control panel.
   2. Shall be fail-safe in the event of power failure to the PACS system.
   3. Shall operate at 24 VCD, with the exception of turnstiles and be powered by a separate power supply dedicated to the door control system. Each power supply shall be rated to operate a minimum of two doors simultaneously without error to the system or overload the power supply unit.
   4. Shall have a diode or metal-oxide veristor (MOV) to protect the controller and power supply from reverse current surges or back-check.
   5. Electric Strikes/Bolts: Shall be:
      a. Made of heavy-duty construction and tamper resistant design.
      b. Tested to over one million cycles.
      c. Rated for a minimum of 1000 lbs. holding strength.
      d. Utilize an actuating solenoid for the strike/bolt. The solenoid shall move from fully open to fully closed position and back in not more than 500 milliseconds and be rated for continuous duty.

e. Utilize a signal switch that shall indicate to the system if the strike/bolt is not engaged or is unlocked when it shall be secured.

f. Flush mounted within the door frame.

6. Electric Mortise Locks: Shall be installed within the door and an electric transfer hinge shall be utilized to allow the wires to be transferred from the door frame to the lock. If utilized with a double door then the lock shall be installed inside the active leaf. Electric Mortise Locks shall:

a. These locks shall be provided and installed by the Division 8 "DOOR HARDWARE" Contractor.

b. Provide integration of the Electric Mortise Locks with the PACS for:

1) Lock Power

c. ectromagnetic locks shall meet the following minimum technical characteristics:

Op		24 VDC
Current Draw		.5A
Holding Force	Swing Doors	675 kg (1500 lbs)
	Sliding Doors	225 kg (500 lbs)

2.11 FLOOR SELECT ELEVATOR CONTROL

A. Elevator access control shall be integral to security access.

1. System shall be capable of providing full elevator security and control through dedicated Controllers without relying on the control-station host PC for elevator control decisions.
2. Access-control system shall enable and disable car calls on each floor and floor select buttons in each elevator car, restricting passengers' access to the floors where they have been given access.
3. System setup shall, through programming, automatically secure and unsecure each floor select button of a car individually by time and day. Each floor select button within a car shall be separately controlled so that some floors shall be secure while others remain unsecure.
4. When a floor select button is secure, it shall require the passenger to use his/her access code and have access to that floor before the floor select button shall operate. The passenger's credential shall determine which car call and floor select buttons shall be enabled,

restricting access to floors unless authorized by system's access code database. Floor select button shall be enabled only in the car where the credential holder is the passenger.

B. PACS shall record which call button is pressed, along with credential and time information.
   1. System Controller shall record elevator access data.
   2. The Controller shall reset all additional call buttons that shall have been enabled by the user's credential.
   3. The floor select elevator control shall allow for manual override either individually by floor or by cab as a group from a workstation PC.

2.12 VIDEO AND CAMERA CONTROL

A. Control station or designated workstation displays live video from a CCTV source.
   1. Control Buttons: On the display window, with separate control buttons to represent Left, Right, Up, Down, Zoom In, Zoom Out, Scan, and a minimum of two custom command auxiliary controls.
   2. Provide at least seven icons to represent different types of cameras, with ability to import custom icons. Provide option for display of icons on graphic maps to represent their physical location.
   3. Provide the alarm-handling window with a command button that will display the camera associated with the alarm point.

B. Display mouse-selectable icons representing each camera source, to select source to be displayed. For CCTV sources that are connected to a video switcher, control station shall automatically send control commands through a COM port to display the requested camera when the camera icon is selected.

C. Allow cameras with preset positioning to be defined by displaying a different icon for each of the presets. Provide control with Next and Previous buttons to allow operator to cycle quickly through the preset positions.

2.13 WIRES AND CABLES

A. Refer to section 28 05 13 "CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY".

B. Comply with Division 28 Section "CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY."

C. All in one composite cable.
   1. This cable is composite construction of 6 conductor 18 AWG strand bare copper conductor insulated with color coded FPR, shielded with a drain wire and FPR jacket; 4 conductors 18 AWG standard bare copper conductors insulated with color coded FPR, shielded with a drain wire and FPR jacket; 2 conductors 16 AWG stranded bare copper conductor insulated with color coded FPR, shielded with drain wire and FPR jacket and 4 conductors 22 AWG stranded bare copper conductor insulated with color coded FPR, shielded with drain wire and an FPR Jacket; a yellow overall SGPVC jacket is applied overall, Type CMP, UL listed 444, NEC 800 and 910 Plenum.
   2. Reader Cable: 6 conductor 18 AWG, bare copper, insulated, shielded with drain wire and FPR jacket.
   3. RX/Motion cable: 4 conductor 18 AWG, bare copper, insulated, shielded with drain wire and FPR jacket
   4. Lock Power cable: 2 conductor 16 AWG, bare copper, insulated, shielded with drain wire and FPR jacket.
   5. Door contact/switch cable: 4 conductor 22 AWG, bare copper, insulated, shielded with drain wire and FPR Jacket.
   6. Over all Jacket, yellow, .46 O.D., with Ripcord under jacket.
   7. UL listed
   8. 300 volts

D. PVC-Jacketed, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; PVC jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   1. NFPA 70, Type CM.
   2. Flame Resistance: UL 1581 Vertical Tray.

E. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

F. RS-485 communications require 2 twisted pairs, with a distance limitation of 4000 feet (1220 m).

G. PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.

H. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

I. Multiconductor, Readers and Wiegand Keypads Cables: No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semi-rigid PVC insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
   1. NFPA 70, Type CMG.
   2. Flame Resistance: UL 1581 Vertical Tray.
   3. For TIA/EIA-RS-232 applications.

J. Paired Readers and Wiegand Keypads Cables: Paired, 3 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
   1. NFPA 70, Type CM.
   2. Flame Resistance: UL 1581 Vertical Tray.

K. Paired Readers and Wiegand Keypads Cable: Paired, 3 pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
   1. NFPA 70, Type CM.
   2. Flame Resistance: UL 1581 Vertical Tray.

L. Plenum-Type, Paired, Readers and Wiegand Keypads Cable: Paired, 3 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum foil-polypropylene tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.

1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

M. Plenum-Type, Multiconductor, Readers and Keypads Cable: 6 conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

N. Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMG.
   2. Flame Resistance: UL 1581 Vertical Tray.

O. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

P. Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMG.
   2. Flame Resistance: UL 1581 Vertical Tray.

Q. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

R. Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum foil-polyester tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
   1. NFPA 70, Type CMR.
   2. Flame Resistance: UL 1666 Riser Flame Test.

S. Plenum-Type, Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene

insulation, aluminum foil-polyester tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.

1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

T. Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.

1. NFPA 70, Type CMG.

U. Plenum-Type, Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.

1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

V. Elevator Travel Cable: Steel center core, with shielded, twisted pairs, No. 20 AWG conductor size.

1. Steel Center Core Support: Preformed, flexible, low-torsion, zinc-coated, steel wire rope; insulated with 60 deg C flame-resistant PVC and covered with a nylon or cotton braid.
2. Shielded Pairs: Insulated copper conductors; color-coded, insulated with 60 deg C flame-resistant PVC; each pair shielded with bare copper braid for 85 percent coverage.
3. Jute Filler: Electrical grade, dry.
4. Binder: Helically wound synthetic fiber.
5. Braid: Rayon or cotton braid applied with 95 percent coverage.
6. Jacket: 60 deg C PVC specifically compounded for flexibility and abrasion resistance. UL VW-1 and CSA FT1 flame rated.

W. LAN (Ethernet) Cabling: Comply with Division 28 Section "Conductors and Cables for Electronic Safety and Security."

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall install all system components and appurtenances in accordance with the manufacturers' instructions, ANSI C2, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified. Control signals, communications, and data transmission lines grounding shall be installed as necessary to preclude ground loops, noise, and surges from

affecting system operation. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with manufacturers' recommendations and as modified herein.

B. Consult the manufacturers' installation manuals for all wiring diagrams, schematics, and physical equipment sizes before beginning system installation. Refer to the Riser/Connection diagram for all schematic system installation/termination/wiring data.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., sensors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

3.2 CURRENT SITE CONDITIONS

A. The Contractor shall visit the site and verify that site conditions are in agreement with the design package. The Contractor shall report all changes to the site or conditions which will affect performance of the system to the Owner in a report as defined in paragraph Group II Technical Data Package. The Contractor shall not take any corrective action without written permission from the Owner.

3.3 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to PCs, Controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with EIA/TIA-606, "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings."

C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.

1. Record setup data for control station and workstations.

2. For each Location, record setup of Controller features and access requirements.
3. Propose start and stop times for time zones and holidays and match up access levels for doors.
4. Set up groups, linking, and list inputs and outputs for each Controller.
5. Assign action message names and compose messages.
6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
7. Prepare and install alarm graphic maps.
8. Develop user-defined fields.
9. Develop screen layout formats.
10. Propose setups for guard tours and key control.
11. Discuss badge layout options; design badges.
12. Complete system diagnostics and operation verification.
13. Prepare a specific plan for system testing, startup, and demonstration.
14. Develop acceptance test concept and, on approval, develop specifics of the test.
15. Develop cable and asset management system details; input data from construction documents. Include system schematics and Technical Drawings.

D. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.5 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Contracting."

B. Install cables and wiring according to requirements in Division 28 Section "Conductors and Cables for Electronic Safety and Security."

C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

D. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air

spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

E. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E rating of components and that ensure Category 5E performance of completed and linked signal paths, end to end.

F. Install cables without damaging conductors, shield, or jacket.

G. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

H. Install end-of-line resistors at the field device location and not at the Controller or panel location.

3.6 CABLE APPLICATION

A. Comply with EIA/TIA-569, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. RS-232 Cabling: Install at a maximum distance of 50 feet (15 m).

D. RS-485 Cabling: Install at a maximum distance of 4000 feet (1220 m).

E. Card Readers and Keypads:

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from Controller to the reader is 250 feet (75 m), and install No. 20 AWG wire if maximum distance is 500 feet (150 m).
3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the Controller.
4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.

F. Install minimum No. 16 AWG cable from Controller to electrically powered locks. Do not exceed 250 feet (75 m).

G. Install minimum No. 18 AWG ac power wire from transformer to Controller, with a maximum distance of 25 feet (8 m).

3.7 GROUNDING

A. Comply with Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Comply with IEEE 1100, "Power and Grounding Sensitive Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Signal Ground:

1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
2. Bus: Mount on wall of main equipment room with standoff insulators.
3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.8 INSTALLATION

A. System installation shall be in accordance with UL 294, manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.

B. Components shall be configured with appropriate “service points” to pinpoint system trouble in less than 30 minutes.

C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.4 and 1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for an operable system.

D. The PACS will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a standalone or a network.

E. For integration purposes, the PACS shall be integrated where appropriate with the following associated security subsystems:

1. CCTV:

a. Provide 24-hour coverage of all entry points to the perimeter and agency buildings. As well as all emergency exits utilizing a fixed color camera.
b. Be able to monitor, control and record cameras on a 24 hours basis.
c. Be programmed automatically call up a camera when an access point is but into an alarm state.
d. For additional PACS system requirements as they relate to the CCTV, refer to Section 28 23 00, VIDEO SURVEILLANCE.

2. PACS:
a. Be able monitor door control sensors.
b. Be able to monitor and control the PACS on a 24 hours basis.
c. Be programmed to go into an alarm state when an PACS device is put into an alarm state and notify the operator via an audible alarm.

F. Integration with these security subsystems shall be achieved by computer programming or the direct hardwiring of the systems.

G. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.

H. The Contractor shall visit the site and verify that site conditions are in agreement with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system. The Contractor shall not take any corrective action without written permission from the Government.

I. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Contracting Officer in the form of a report. The Contractor shall not take any corrective action without written permission received from the Contracting Officer.

J. Existing Equipment:
1. The Contractor shall connect to and utilize existing door equipment, control signal transmission lines, and devices as outlined in the design package. Door equipment and signal lines that are usable in

their original configuration without modification may be reused with Contracting Officer approval.

2. The Contractor shall perform a field survey, including testing and inspection of all existing door equipment and signal lines intended to be incorporated into the PACS, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment and creating equipment downtime. Such work shall proceed only after receiving Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.
4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or improper installation of equipment.
5. The Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.

K. Enclosure Penetrations: All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and will comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall

be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.

L. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

M. Card Readers:

1. Connect all signal inputs and outputs as shown and specified.
2. Terminate input signals as required.
3. Program and address the reader as per the design package.
4. Readers shall be surface or flushed mounted and all appropriate hardware shall be provided to ensure the unit is installed in an enclosed conduit system.

N. Door Status Indicators:

1. Install all signal input and output cables as well as all power cables.
2. RTE’s shall be surface mounted and angled in a manner that they cannot be compromised from the non-secure side of a windowed door or allow for easy release of the locking device from a distance no greater than 6 feet from the base of the door.
3. Door position sensors shall be surface or flush mounted and wide gap with the ability to operate at a maximum distance of up to 2” (5 cm).

O. Entry Control Devices:

1. Install all signal input and power cables.
2. Strikes and bolts shall be mounted within the door frame.
3. Mortise locks shall be mounted within the door and an electric transfer hinge shall be utilized to transfer the wire from within the door frame to the mortise lock inside the door.
4. Electromagnetic locks shall be installed with the mag-lock mounted to the door frame and the metal plate mounted to the door.

P. System Start-Up:

1. The Contractor shall not apply power to the PACS until the following items have been completed:
   a. PACS equipment items and have been set up in accordance with manufacturer's instructions.

b. A visual inspection of the PACS has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
c. System wiring has been tested and verified as correctly connected as indicated.
d. All system grounding and transient protection systems have been verified as installed and connected as indicated.
e. Power supplies to be connected to the PACS have been verified as the correct voltage, phasing, and frequency as indicated.

2. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.
3. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR and Commissioning Agent. Provide a minimum of 7 days prior notice.

Q. Supplemental Contractor Quality Control:

1. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed PACS; and are approved by the Contracting Officer.
2. The Contractor shall be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.
3. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
4. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.
5. Keypad shall arm and disarm the PACS door, coordinate with COR.

3.9 SYSTEM SOFTWARE

A. Install, configure, and test software and databases for the complete and proper operation of systems involved. Assign software license to Owner.

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing]. Report results in writing.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports:

C. Perform the following field tests and inspections and prepare test reports:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-568-1, "Commercial Building Telecommunications Cabling Standards - Part 1 General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA-568-B.
2. Test each circuit and component of each system. Tests shall include, measurements of power supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

3.11 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured, with an activated burglar alarm and access-control system reporting to a Central Station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

---END---

SECTION 28 23 00
VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide and install a complete Video Surveillance System, which is identified as the Video Assessment and Surveillance System hereinafter referred to as the VASS System as specified in this section.

B. This Section includes video surveillance system consisting of cameras, data transmission wiring, and a control station with its associated equipment to match the existing CCTV system.

C. Video surveillance system Video assessment & surveillance system shall be integrated with monitoring and control system specified in Division 28 Section PHYSICAL ACCESS CONTROL that specifies systems integration.

1.2 RELATED WORK

A. Section 01 00 00 - GENERAL REQUIREMENTS. For General Requirements.

B. Section 07 84 00 - FIRESTOPPING. Requirements for firestopping application and use.

C. Section 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS. Requirements for connection of high voltage.

D. Section 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW). Requirements for power cables.

E. Section 28 05 00 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY. Requirements for general requirements that are common to more than one section in Division 28.

F. Section 28 05 13 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for conductors and cables.

G. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for grounding of equipment.

H. Section 28 05 28.33 - CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for infrastructure.

I. Section 28 13 00 - PHYSICAL ACCESS CONTROL SYSTEM. Requirements for physical access control system integration.

1.3 DEFINITIONS

A. AGC: Automatic gain control.

B. B/W: Black and white.

C. CCD: Charge-coupled device.

D. CIF: Common Intermediate Format CIF images are 352 pixels wide and 88/240 (PAL/NTSC) pixels tall (352 x 288/240).

E. 4CIF: resolution is 704 pixels wide and 576/480 (PAL/NTSC) pixels tall (704 x 576/480).

F. H.264 (also known as MPEG4 Part 10): a encoding format that compresses video much more effectively than older (MPEG4) standards.

G. ips: Images per second.

H. MPEG: Moving picture experts group.

I. MPEG4: a video encoding and compression standard that uses inter-frame encoding to significantly reduce the size of the video stream being transmitted.

J. NTSC: National Television System Committee.

K. UPS: Uninterruptible power supply.

L. PTZ: refers to a movable camera that has the ability to pan left and right, tilt up and down, and zoom or magnify a scene.

1.4 QUALITY ASSURANCE

A. The Contractor shall be responsible for providing, installing, and the operation of the VASS System as shown. The Contractor shall also provide certification as required.

B. The security system shall be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.

C. The Contractor or security sub-contractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation work is being conducted.

D. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

E. Product Qualification:

1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.

F. Contractor Qualification:

1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of three (3) years experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Video Assessment and Surveillance System's (VASS) manufacturer. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as the proposed system. The references shall include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system manufacturer certification for all technicians. The Contractor shall only utilize factory-trained technicians to install, program, and service the VASS. The Contractor shall only utilize factory-trained technicians to install, terminate and service cameras, control, and recording equipment. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. The Contractor shall have a local service facility. The facility shall be located within 4 hours of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The COR reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.
2. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
3. Cable installer shall have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide

consistent oversight of the project cabling throughout design, layout, installation, termination and testing.

G. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which shall render satisfactory service to this installation within eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 SUBMITTALS

A. Submit below items in conjunction with Master Specification Sections 01 33 23, Shop Drawings, Product Data, and Samples, and Section 02 41 00, Demolition Drawings.

B. Provide certificates of compliance with Section 1.4, Quality Assurance.

C. Provide a pre-installation and as-built design package in both electronic format and on paper, minimum size 1220 x 1220 millimeters (48 x 48 inches); drawing submittals shall be per the established project schedule.

D. Pre-installation design and as-built packages shall include:

1. Index Sheet that shall:
   a. Define each page of the design package to include facility name, building name, floor, and sheet number.
   b. Provide a list of all security abbreviations and symbols.
   c. Reference all general notes that are utilized within the design package.
   d. Specification and scope of work pages for all security systems that are applicable to the design package that will:
      1) Outline all general and job specific work required within the design package.
      2) Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
2. Floor plans, site plans, and enlarged plans shall:
   a. Include a title block as defined above.
   b. Define the drawings scale in both standard and metric measurements.
   c. Provide device identification and location.

d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers).
e. Identify all pull box and conduit locations, sizes, and fill capacities.
f. Address all general and drawing specific notes for a particular drawing sheet.

3. A riser drawing for each applicable security subsystem shall:
   a. Indicate the sequence of operation.
   b. Relationship of integrated components on one diagram.
   c. Include the number, size, identification, and maximum lengths of interconnecting wires.
   d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that shall correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer’s name and part number for the wire/cable being installed.
4. A system drawing for each applicable security system shall:
   a. Identify how all equipment within the system, from main panel to device, shall be laid out and connected.
   b. Provide full detail of all system components wiring from point-to-point.
   c. Identify wire types utilized for connection, interconnection with associate security subsystems.
   d. Show device locations that correspond to the floor plans.
   e. All general and drawing specific notes shall be included with the system drawings.
5. A schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
   a. Device ID.
   b. Device Location (e.g. site, building, floor, room number, location, and description).
   c. Mounting type (e.g. flush, wall, surface).
   d. Power supply or circuit breaker and power panel number.

e. In addition, for the VASS Systems, provide the camera ID, camera type (e.g. fixed or pan/tilt/zoom (P/T/Z), lens type (e.g. for fixed cameras only) and housing model number.

E. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.

F. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA):

330-09	Electrical Performance Standards for CCTV Cameras
375A-76	Electrical Performance Standards for CCTV Monitors

C. Institute of Electrical and Electronics Engineers (IEEE):

C62.41-02	IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
802.3af-08	Power over Ethernet Standard

D. Federal Communications Commision (FCC):

E. (47 CFR 15) Part 15 Limitations on the Use of Wireless Equipment/Systems

F. National Electrical Contractors Association (NECA):

303-2005	Installing Closed Circuit Television (CCTV) Systems

G. National Fire Protection Association (NFPA):

70-2020	Article 780-National Electrical Code

H. Federal Information Processing Standard (FIPS):

140-2-02	Security Requirements for Cryptographic Modules

I. Underwriters Laboratories, Inc. (UL):

983-06	Standard for Surveillance Camera Units
3044-01	Standard for Surveillance Closed Circuit Television Equipment

1.7 COORDINATION

A. Coordinate arrangement, mounting, and support of video surveillance equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. To connecting raceways, cables, wireways, cable trays, and busways shall be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for video surveillance items that are behind finished surfaces or otherwise concealed.

1.8 WARRANTY OF CONSTRUCTION

A. Warrant VASS System work subject to the Article "Warranty of Construction" of FAR clause 52.246-21.

B. Demonstration and training shall be performed prior to system acceptance.

PART 2 - PRODUCTS

2.1 GENERAL

A. Video signal format shall comply with Ethernet IP signal at 100 Ohms.

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

C. Power Connections: Comply with requirements in Section 28 05 00 COMMON WORK REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY, Part 2, as recommended by manufacturer for type of line being protected.

D. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 CAMERAS

A. All Cameras shall be EIA 330 and UL 1.Minimum Protection for Power Connections 120 V and more: Auxiliary panel suppressors shall comply with requirements in Section 28 05 00 COMMON WORK REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY, Part 2.

B. Minimum Protection for Communication, Signal, Control, and Low-Voltage 983 compliant as well as:

1. Will be charge coupled device (CCD cameras and shall conform to National Television System Committee (NTSC) formatting.
2. Fixed cameras shall be color and the primary choice for monitoring following the activities described below. Pan/Tilt/Zoom (P/T/Z) cameras shall be color and shall be utilized to complement the fixed cameras.
3. Shall be powered over Ethernet. Network switches supporting PoE cameras shall have a back-up power source to ensure cameras are still operational in the event of loss of primary power to the VASS System.
4. Shall be rated for continuous operation under the environmental conditions listed in Part 1, Project Conditions.
5. Will be home run to a monitoring and recording device via a controlling device such as a matrix switcher or network server and monitored on a 24 hour basis at a designated Security Management System location.
6. Each function and activity shall be addressed within the system by a unique user defined name, with minimum of twenty (20) characters. The use of codes or mnemonics identifying the VASS action shall not be accepted.
7. Shall come with built-in video motion detection that shall automatically monitor and process information from each camera. The

camera motion detection shall detect motion within the camera's field of view and provide automatic visual, remote alarms as a result of detected motion.

8. Shall be programmed to digitally flip from color to black and white at dusk and vice versa at low light conditions.
9. Will be fitted with AI/DC lenses to ensure the image quality under different light conditions.
10. Dummy or fake cameras shall not be utilized at any time.
11. Appropriate signage shall be designed, provided, and posted that notifies people that an area is under camera surveillance.

C. Licensing Structure

1. Base Server License
   a. An VMS Base Server license is mandatory for installing the product.
2. The Base Server license contains:
   a. Unlimited numbers of Recording Server licenses
   b. Unlimited numbers of Smart Clients, Remote Clients, PDA Clients and Matrix Monitor licenses
3. Camera License
   a. To connect to a camera, a Device License per camera channel is required
   b. In total, for all copies of the product installed under a given Base Server license, the product may only be used with as many cameras as you have purchased camera licenses for • Video encoders and DVRs with multiple analog cameras require a license per channel to operate
   c. Camera Licenses can be purchased in any numbers. To extend the installation with additional Camera Licenses, the Base Server License number (SLC) is required when ordering.
4. Client License:
   a. All client modules are not licensed and can be installed and used on any number of computers.

2.3 IP COLOR DOME CAMERAS

A. The camera shall be a high-resolution color video camera with wide dynamic range capturing capability.

B. Comply with UL 639.

C. Pickup Device: 1/3 CCD interline transfer.

D. IP base at minimum of 3.1 MPixels.

E. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off.

F. With AGC, manually selectable on or off.

G. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of 1.5 lux at .9 f-stop of lens, with the camera AGC off.

H. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.

I. Manually selectable modes for backlight compensation or normal lighting.

J. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be variable controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.

K. Preset positioning: 64 user-definable scenes. Controls shall include the following:

1. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
2. Motion detection shall be available at each camera position.

L. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.

M. White Balance: Auto-tracing white balance, with manually settable fixed balance option.

N. Motion Detector: Built-in digital.

O. Dome shall support multiplexed control communications using coaxial cable recommended by manufacturer.

P. Cameras shall be multi sensors.

Q. Cameras shall meet National Defense=se Authorization Act-NDAA, no cameras or camera component shall be purchased from Chinese manufacturers.

R. Megapixel High Definition Integrated Digital Network Camera

1. The network camera shall offer dual video streams with up to 3.1 megapixel resolution (2048 x 1536) in progressive scan format.

2. An alarm input and relay output shall be built in for integration with hard wired external sensors.
3. The network camera shall be capable of firmware upgrades through a network using a software-based device utility.
4. The network camera shall offer auto back focus (ABF) functionality through a push button on the camera. ABF parameters shall also be configurable through a standard Web browser interface.
5. The network camera shall offer a video output port providing an NTSC/PAL analog video output signal for adjusting field of view and focus at the camera.
6. The network camera shall provide advanced low-light capabilities for color and day/night models with sensitivity down to 0.12 lux in color and 0.03 lux in black-white (B-W).
7. The network camera shall have removable IR cut filter mechanism for increased sensitivity in low-light installations. The sensitivity of IR cut filter removal shall be configurable through a Web browser.
8. The network camera shall support two simultaneous, configurable video streams. H.264 and MJPEG compression formats shall be available for primary and secondary streams with selectable unicast and multicast protocols. The streams shall be configurable in a variety of frame rates and bit rates.
9. The network camera shall support industry standard Power over Ethernet (PoE)
10. IEEE 802.3af to supply power to the camera over the network. The network camera shall also offer a 24 VAC power input for optional use.
11. The network camera shall use a standard Web browser interface for remote administration and configuration of camera parameters.
12. The network camera shall have a window blanking feature to conceal user-defined privacy areas that cannot be viewed by an operator. The network camera shall support up to four blanked windows. A blanked area shall appear on the screen as a solid gray window.
13. The network camera shall support standard IT protocols.
14. The network camera shall support open architecture best practices with a published API available to third-party network video recording and management systems.

15. Cameras shall be multi sensors.
16. Cameras shall meet National Defense=se Authorization Act-NDAA, no cameras or camera component shall be purchased from Chinese manufacturers.
17. Megapixel High Definition Integrated Digital Network Camera Technical Specifications:

Imaging Device	1/3-inch, effective
Imager Type	CMOS, Progressive scan
Maximum Resolution	2048 x 1536
Signal-to-Noise Ratio	50 dB
Auto Iris Lens Type	DC drive
Electronic Shutter Range	1~1/100,000 sec
Wide Dynamic Range	60 dB
White Balance Range	2,000° to 10,000°K
Sensitivity	f/1.2; 2,850K; SNR >24dB Color (1x/33ms) 0.50 lux Color SENS (15x/500 ms) 0.12 lux Mono SENS (15x/500 ms) Mono (1x/33ms)0.25 lux 0.03 lux
Dome Attenuation	Clear Zero light loss Smoke f/1.0 light loss
Compression	H.264 in base profile and MJPEG
Video Streams	Up to 2 simultaneous streams, the second Stream variable based on the setup of the primary stream
Frame Rate	Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6.5, 4, 3, 2, and 1 (depending upon coding, resolution, and stream configuration
Available Resolutions	3.1 MPx2048 x 1536; 4:3 aspect ratio; 2.0 ips max., 10.0 Mbps bit rate for MJPEG; 3.0 ips max., 2.6 Mbps bit rate H.264 2.1 MPx1920 x 1080; 16:9 aspect ratio: 15.0 ips max.,10.0 Mbps bit rate for MJPEG; 5.0 ips max., 2.7 Mbps bit rate H.264 3.1.9 MPx1600 x 1200; 4:3 aspect ratio; 15.0 ips max.,10.0 Mbps bit rate for MJPEG; 6.0 ips max., 2.6 Mbps bit rate H.264 1.3 MPx1280 x 1024; 5:4 aspect ratio; 15.0 ips max.,10.0 Mbps bit

	rate for MJPEG; 8.0 ips max., 2.5 Mbps bit rate H.264 1.2 MPx1280 x 960; 4:3 aspect ratio; 15.0 ips max., 9.8 Mbps bit rate for MJPEG; 9.8 ips max., 8.5 Mbps bit rate H.264 6.0.9 MPx1280 x 720; 16:9 aspect ratio; 30.0 ips max.,10.0 Mbps bit rate for MJPEG; 12.5 ips max., 2.5 Mbps bit rate H.264 0.5 MPx800 x 600; 4:3 aspect ratio; 30.0 ips max., 5.8 Mbps bit rate for MJPEG; 25.0 ips max., 2.0 Mbps bit rate H.264 8.0.3 MPx640 x 480; 4:3 aspect ratio; 30.0 ips max., 3.7 Mbps bit rate for MJPEG; 30.0 ips max.,1.6 Mbps bit rate H.264 0.1 MPx320 x 240; 4:3 aspect ratio; 30.0 ips max., 0.9 Mbps bit rate for MJPEG; 30.0 ips max., 0.4 Mbps bit rate H.264 Additional640 x 512, 640 x 352, 480 x 368, 480 x 272, 320 x 256, 320 x 176
Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP,IPv4, SNMP, QoS, HTTP, HTTPS, LDAP(client), SSH, SSL, STMP, FTP, MDNS(Bonjour), and 802.1x (EAP)
Security Access	Password protected
Software Interface	Web browser view and setup, up to 16 cameras
Connectors	RJ-45 for 100Base-TX, Auto MDI/MDI-X
Cable	Cat6 cable or better for 100Base-TX
Input Voltage	24 VAC or PoE (IEEE802.3af class 3)
Power Consumption	30 W
Current Consumption	PoE <200 mA maximum 24 VAC <295 mA nominal; <390 mA maximum
Alarm Input	10 VDC maximum, 5 mA maximum
Alarm Output	0 to 15 VDC maximum, 75 mA maximum
Lens Mount	CS mount, adjustable
Multi sensor	90/180/270 and 360 degree cameras.

18. Accessories

   a. wall mount

b. dome mount

c. Corner adapter for wall mount

19. Recommended Lenses

a. Megapixel lens, varifocal, 2.2~6.0 mm, f/1.3~2.0

b. Megapixel lens, varifocal, 2.8~8.0 mm, f/1.1~1.9

S. LENSES

1. Camera Field of View shall be set by the Contractor to produce full view of door or window opening and anyone entering or leaving through it. Follow the project construction drawings for design intent.
2. Camera Lenses shall be of the type supplied with the camera from the manufacture. All cameras which are not supplied with lenses from the factory are specified in this specification. The lens shall be equipped with an auto-iris mechanism unless otherwise specified. Lenses having auto-iris, DC iris, or motor zoom functions shall be supplied with connectors, wiring, receiver/drivers, and controls as needed to operate the lens functions. Lenses shall have sufficient circle of illumination to cover the image sensor evenly. Lenses shall not be used on a camera with an image format larger than the lens is designed to cover. Lenses shall be provided with pre-set capability.
3. Lenses shall have optical-quality coated optics, designed specifically for video surveillance applications, and matched to specified camera. Provide color-corrected lenses with color cameras, megapixel lenses for megapixel cameras, and lenses with day/night for color/b&w cameras.
4. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions.
5. Zoom Lenses: Motorized, remote-controlled units, rated as "quiet operating." Features include the following:
   a. Electrical Leads: Filtered to minimize video signal interference.
   b. Motor Speed: Variable.
   c. Lens shall be available with preset positioning capability to recall the position of specific scenes.
6. Lenses: Shall be utilized in a manner that provides maximum coverage of the area being monitored by the camera. The lenses shall:

a. Be 1/3" to fit CCD fixed camera.
b. Be all glass with coated optics.
c. Have mounts that are compatible with the camera selected.
d. Be packaged and supplied with the camera.
e. Have a maximum f-stop of f/1.3 for fixed lenses, and a maximum f-stop of f/1.6 for variable focus lenses.
f. Be equipped with an auto-iris mechanism.
g. Have sufficient circle of illumination to cover the image sensor evenly.
h. Not be used on a camera with an image format larger than the lens is designed to cover.
i. Be provided with pre-set capability.

7. Two types of lenses shall be utilized for both interior and exterior fixed cameras:
   a. Manual Variable Focus
   b. Auto Iris Fixed
8. Manual Variable Focus:
   a. Shall be utilized in large areas that are being monitored by the camera. Examples of this are perimeter fence lines, vehicle entry points, and parking areas.
   b. Shall allow for setting virtually any angle of field, which maximizes surveillance effects.
   c. Technical Characteristics:

Image format	1/3 inch
Focal length	5–50mm
Iris range	F1.4 to close
Focus range	1m (3.3 ft)
Back focus distance	10.05 mm (0.4 in)
Angle view Wide (1/3 in)	53.4 x 40.1
Angle view Tele (1/3 in)	5.3 x 4.1
Iris control	manual
Focus ctrl	manual
Zoom ctrl	manual

T. CAMERA HOUSINGS AND MOUNTS

1. This section pertains to all interior and exterior housings, domes, and applicable wall, ceiling, corner, pole, and rooftop mounts

associated with the housing. Housings and mounts shall be specified in accordance to the type of cameras used.

2. All cameras and lenses shall be enclosed in a tamper resistant housing. Any additional mounting hardware required to install the camera housing at its specified location shall be provided along with the housing.
3. The camera and lens contained inside the housing shall be installed on a camera mount. All additional mounting hardware required to install the camera housing at its specified location shall be provided along with the housing.
4. Shall be manufactured in a manner that are capable of supporting a maximum of three (3) cameras with housings, and meet environmental requirements for the geographical area the camera support equipment is being installed on or within.
5. Environmentally Sealed
   a. Shall be designed in manner that it provides a condensation free environment for correct camera operation.
   b. Shall be operated in a 100 percent condensing humidity atmosphere.
   c. Shall be constructed in a manner that:
      1) Has a fill valve to allow for the introduction of nitrogen into the housing to eliminate existing atmospheric air and pressurize the housing to create moisture free conditions.
      2) Has an overpressure valve to prevent damage to the housing in the event of over pressurization.
      3) Is equipped with a humidity indicator that is visible to the eye to ensure correct atmospheric conditions at all times.
      4) The leak rate of the housing is not to be greater than 13.8kPa or 2 pounds per square inch at sea level within a 90 day period.
      5) It shall contain camera mounts or supports as needed to allow for correct positioning of the camera and lens.
      6) The housing and sunshield shall be white in color.
6. All electrical and signal cables required for correct operations shall be supplied in a hardened carrier system from the controller to the camera.

7. The mounting bracket shall be adjustable to allow for the housing weight of the camera and the housing unit it is placed in.
8. Accessibility to the camera and mounts shall be taken into consideration for maintenance and service purposes.

U. Indoor Mounts

1. Ceiling Mounts:
   a. This enclosure and mount shall be installed in a finished or suspended ceiling.
   b. The enclosure and mount shall be fastened to the finished ceiling and shall not depend on the ceiling tile grid for complete support.
   c. Suspended ceiling mounts shall be low profile, and shall be suitable for replacement of 610mm x 610mm (2 foot by 2 foot) ceiling tiles.
2. Wall Mounts:
   a. The enclosure shall be installed in manner that it matches the existing décor and placed at a height that it shall be unobtrusive, unable to cause personal harm, and prevents tampering and vandalism.
   b. he mount shall contain a manual pan/tilt head that shall provide 360 degrees of horizontal and vertical positioning from a horizontal position, and has a locking bar or screw to maintain its fixed position once it has been adjusted.

V. Interior Domes

1. The interior dome shall be a pendant mount, pole mount, ceiling mount, surface mount, or corner mounted equipment.
2. The lower portion of the dome that provides camera viewing shall be made of black opaque acrylic and shall have a light attenuation factor of no more than 1 f-stop.
3. The housing shall be equipped with integral pan/tilt capabilities complete with wiring, wiring harness, connectors, receiver/driver, pan/tilt control system, pre-position cards, or any other hardware and equipment as needed to fully provide a fully functional pan/tilt dome.

2.4 POWER SUPPLIES

A. Power supplies shall be from an enhance PoE data switch.

B. Provide PoE switches for the new cameras and connect to the existing CCTV system.

C. B.O.D.: Cisco 3950 series with 2-10Gig Uplink and software.

2.5 NETWORK SERVER

A. Existing.

B. Network Switch Technical Characteristics

Protocol and standard	IEEE802.3at IEEE802.3u IEEE802.3ab IEEE 802.3bz IEEE 802.1ba
Uplink ports	4X1 Gig, 2x10 Gig, 4x10 Gig
Software support	IPv4 and IPv6 routing.
Ports	24 100/1000M auto-negotiation RJ-45 ports with auto MDI/MDI-X, with 2-10Gig uplink
Ports	48 100/1000M auto-negotiation RJ-45 ports with auto MDI/MDI-X, with 4-10Gig uplink
Transmission method	store-and-forward
Power	715 W for 24 port, 1100 W for 48.
LED	indicator power, act/link, speed
Safety Compliance	UL 60950-1, CAN/CSA-C22.2

C. Network Video Recorder (NVR)-Existing

2.6 WIRES AND CABLES

A. Shall meet or exceed the manufactures recommendation for power and signal.

B. Will be carried in an enclosed conduit system, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.

C. All conduits shall be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space shall contained in either EMT or RGS conduit.

D. All conduit, pull boxes, and junction boxes shall be clearly marked with colored permanent tape or paint that shall allow it to be distinguished from all other conduit and infrastructure.

E. Conduit fills shall not exceed 50 percent unless otherwise documented.

F. A pull string shall be pulled along and provided with signal and power cables to assist in future installations.

G. At all locations where there is a wall penetration or core drilling is conducted to allow for conduit to be installed, fire stopping materials shall be applied to that area

H. High voltage and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High voltage for the security system shall be defined as any cable or sets of cables carrying 30 VDC/VAC or higher.

I. For all equipment that is carrying digital data between the Physical Access Control System and Database Management or at a remote monitoring station, shall not be less that 20 AWG and stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100% coverage. Cables with a single overall shield shall have a tinned copper shield drain wire.

J. All cables and conductors, except fiber optic cables, that act as a control, communication, or signal lines shall include surge protection. Surge protection shall be furnished at the equipment end and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 1 m. (3 ft.) of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:
   1. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 watts and peak current of 60 amperes.
   2. An 8 microsecond rise time by 20 microsecond pulse width wave form with a peak voltage of 1000 volts and peak current of 500 amperes.

K. The surge suppression device shall not attenuate or reduce the video or sync signal under normal conditions. Fuses and relays shall not be used as a means of surge protection.

L. Cables:
   1. CCTV video signal cables be copper 4 PR UTP for up to 295 feet and have a characteristic impedance of 100 ohms plus or minus 5 ohms.
   2. CCTV video camera cables for cameras that are over 295 feet shall be Fiber optic cable, provide transceiver at each camera, and provide 4 PR UTP for power.
   3. Cables:

a. Signal wiring for PoE cameras depends on the distance the camera is being installed from either a hub or the server.
b. If the camera is up to 295 ft from a hub or the server, then use a shielded UTP category 6 (CAT-VI) cable a with standard RJ-45 connector at each end. The cable with comply with the Power over Ethernet, IEEE802.3af, Standard.
c. If the camera is over 300 ft from a hub or server then utilize a multimode fiber optic cable with a minimum size of 50 microns.
d. Provide a separate cable for power.
e. CAT-6 Technical Characteristics:

Number of Pairs	4
Total Number of Conductors	8
AWG	24
Stranding	Solid
Conductor Material	BC - Bare Copper
Insulation Material	PO – Polyolefin
Overall Nominal Diameter	.230 in.
IEC Specification	11801 Category 6
TIA/EIA Specification	568-B.2 Category 6e
Max. Capacitance Unbalance	(pF/100 m) 150 pF/100 m
Nom. Velocity of Propagation	70 %
Max. Delay	(ns/100 m) 538 @ 100MHz
Max. Delay Skew	(ns/100m) 45 ns/100 m
Max. Conductor DC Resistance	9.38 Ohms/100
Max. DCR Unbalance@ 20°C	3 %
Max. Operating Voltage	UL 300 V RMS

4. Fiber Optic Cables Technical Characteristics:

Fiber Type	50 Micron
Number of Fibers	4
Core Diameter 6	2.5 +/- 2.5 microns
Core Non-Circularity	5% Maximum
Clad Diameter	125 +/- 2 microns
Clad Non-Circularity	1% Maximum
Core-clad Offset	1.5 Microns Maximum
Primary Coating Material	Acrylate
Primary Coating Diameter	245 +/- 10 microns

Secondary Coating Material	Engineering Thermoplastic
Secondary Coating Diameter	900 +/- 50 microns
Strength Member Material	Aramid Yarn
Outer Jacket Material	PVC
Outer Jacket Color	Orange
Overall Diameter	.200 in.
Numerical Aperture	.275
Maximum Gigabit Ethernet	300 meters
Maximum Gigabit Ethernet	550 meters

5. Power Cables
   a. Will be sized accordingly and shall comply with the NEC. High voltage power cables shall be a minimum of three conductors, 14 AWG, stranded, and coated with a non-conductive polyvinylchloride (PVC) jacket. Low voltage cables shall be a minimum of 18 AWG, stranded and non-conductive polyvinylchloride (PVC) jacket.
   b. Will be utilized for all components of the VASS System that require either a 110 VAC 60 Hz or 220 VAC 50 Hz input. Each feed shall be connected to a dedicated circuit breaker at a power panel that is primarily for the security system.
   c. All equipment connected to AC power shall be protected from surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41. Fuses shall not be used as a means of surge protection.
   d. Shall be rated for either 110 or 220 VAC, 50 or 60 Hz, and shall comply with VA Master Spec 26 05 21 Low Voltage Electrical Power Conductors and Cables (600 Volts and Below).
   e. Low Voltage Power Cables
      1) Shall be a minimum of 18 AWG, Stranded and have a polyvinylchloride outer jacket.
      2) Cable size shall be determined using a basic voltage over distance calculation and shall comply with the NEC’s requirements for low voltage cables.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: The Contractor shall install all system components including Owner furnished equipment, and appurtenances in accordance with the manufacturer's instructions, ANSI C2 and as shown, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable data transmission system.

B. Identification and Labeling: The Contractor shall supply permanent identification labels for each cable at each end that shall appear on the as-built drawings. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation. Each cable shall be identified by type or signal being carried and termination points. The labels shall be printed on letter size label sheets that are self-laminated vinyl that can be printed from a computer data base or spread sheet. The labels shall be E-Z code WES12112 or equivalent.

1. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.

C. Transient Voltage Surge Suppressors (TVSS): The Contractor shall mount TVSS within 3 m (118 in) of equipment to be protected inside terminal cabinets or suitable NEMA 1 enclosures. Terminate off-premise conductors on input side of device. Connect the output side of the device to the equipment to be protected. Connect ground lug to a low impedance earth ground (less than 10 ohms) via Number 12 AWG insulated, stranded copper conductor.

D. Contractor's Field Test: The Contractor shall verify the complete operation of the data transmission system during the Contractor's Field Testing. Field test shall include a bit error rate test. The Contractor shall perform the test by sending a minimum of 1,000,000 bits of data on each DTM circuit and measuring the bit error rate. The bit error rate shall not be greater than one (1) bit out of each 100,000 bits sent for each dial-up DTM circuit, and one (1) bit out of 1,000,000 bits sent for each leased or private DTM circuit. The Contractor shall submit a report containing results of the field test.

E. Acceptance Test and Endurance Test: The wire line data transmission system shall be tested as a part of the completed IDS and EECS during the Acceptance test and Endurance Test as specified.

F. Identification and Labeling: The Contractor shall supply identification tags or labels for each cable. Cable shall be labeled at both end points and at intermediate hand holes, manholes, and junction boxes. The labeling format shall be identified, and a complete record shall be provided to the Owner with the final documentation. Each cable shall be identified with type of signal being carried and termination points.

3.2 INSTALLATION

A. System installation shall be in accordance with NECA 303, manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.

B. Components shall be configured with appropriate “service points” to pinpoint system trouble in less than 30 minutes.

C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.

D. The VASS System shall be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a stand-alone or a complete network.

E. For integration purposes, the VASS System shall be integrated where appropriate with the following associated security subsystems:

1. PACS:
   a. Provide 24 hour coverage of all entry points to the perimeter and agency buildings, as well as all emergency exits utilizing a fixed color camera.
   b. Record cameras on a 24 hours basis.
   c. Be programmed go into an alarm state when an emergency exit is opened and notify the Physical Access Control System and Database Management of an alarm event.

F. Integration with these security subsystems shall be achieved by computer programming or the direct hardwiring of the systems.

G. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.

H. A complete VASS System shall be comprised of the following components:
   1. Cameras
   2. Lenses
   3. Video Display Equipment
   4. Camera Housings and Mounts
   5. Controlling Equipment
   6. Recording Devices
   7. Wiring and Cables

I. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that shall affect performance of the system to the Contracting Officer in the form of a report. The Contractor shall not take any corrective action without written permission received from the Contracting Officer.

J. Existing Equipment
   1. The Contractor shall connect to and utilize existing video equipment, video and control signal transmission lines, and devices as outlined in the design package. Video equipment and signal lines that are usable in their original configuration without modification may be reused with Contracting Officer approval.
   2. The Contractor shall perform a field survey, including testing and inspection of all existing video equipment and signal lines intended to be incorporated into the VASS System, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
   3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating

equipment downtime. Such work shall proceed only after receiving Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.

4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or incorrect installation of equipment.
5. The Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.

K. Enclosure Penetrations: All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and shall comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.

L. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

M. Interconnection of Console Video Equipment: The Contractor shall connect signal paths between video equipment as specified by the OEM. Cables shall be as short as practicable for each signal path without causing strain at the connectors. Rack mounted equipment on slide mounts shall have cables of sufficient length to allow full extension of the slide rails from the rack.

N. Cameras:

1. Install the cameras with the focal length lens as indicated for each zone.
2. Connect power and signal lines to the camera.
3. Aim camera to give field of view as needed to cover the alarm zone.
4. Aim fixed mounted cameras installed outdoors facing the rising or setting sun sufficiently below the horizon to preclude the camera looking directly at the sun.
5. Focus the lens to give a sharp picture (to include checking for day and night focus and image quality) over the entire field of view
6. Synchronize all cameras so the picture does not roll on the monitor when cameras are selected.
7. PTZ cameras shall have all preset positions and privacy areas defined and programmed.

O. Video Encoder/Decoder

1. Install the Video Encoder/Decoder per design and construction documents, and as specified by the OEM.
2. Connect analog camera inputs to video encoder.
3. Connect network camera to video decoder.
4. Connect video encoder to VASS network.
5. Connect video decoder to video matrix, DVR, and monitor.
6. Connect unit to AC power (UPS).
7. Configure the video encoder/decoder per manufacturer’s recommendation and project requirements.

P. Network Switch:

1. Install the network switch per design and construction documents, and as specified by the OEM.
2. Connect network switch to AC power (UPS).
3. Connect network cameras to network switch.
4. Configure the network switch per manufacturer’s recommendation and project requirements.

Q. Network Recording Equipment

1. Install the NVR or video storage unit as shown in the design and construction documents, and as specified by the OEM.
2. Connect recording device to AC power (UPS).
3. Connect recording device to network switch as shown and specified.
4. Configure network connections

5. Provide recording unit programming per VA guidance and the requirements provided by the Owner. Programming shall include:
   a. Camera names
   b. Screen views
   c. Camera recording schedules (continuous and event) driven recording. Events include alarms from other systems (sensors), manual input, and video motion detection.
   d. Video detection zones for each camera requiring video motion detection
   e. Alarm interface
   f. Alarm outputs
   g. GUI maps, views, icons and actions
   h. PTZ controls (presets, time schedules for privacy zones)
   i. Reports

R. Video Recording Equipment:
1. Install the video recording equipment as shown in the design and construction documents, and as specified by the OEM.
2. Connect video signal inputs and outputs as shown and specified.
3. Connect alarm signal inputs and outputs as shown and specified.
4. Connect video recording equipment to AC power.
5. Program the video recording equipment;
   a. Recording schedules
   b. Camera caption

S. Video Signal Equipment:
1. Install the video signal equipment as shown in the design and construction documents, and as specified by the OEM.
2. Connect video or signal inputs and outputs as shown and specified.
3. Terminate video inputs as required.
4. Connect alarm signal inputs and outputs as required.
5. Connect control signal inputs and outputs as required
6. Connect electrically powered equipment to AC power.

T. Camera Housings, Mounts, and Poles:
1. Install the camera housings and mounts as specified by the manufacturer and as shown, provide mounting hardware sized appropriately to secure each camera, housing and mount with maximum wind and ice loading encountered at the site.
2. Provide a foundation for each camera pole as specified and shown.

3. Provide a ground rod for each camera pole and connect the camera pole to the ground rod as specified in Division 26 of the VA Master Specification and the VA Electrical Manual 730.
4. Provide electrical and signal transmission cabling to the mount location via a hardened carrier system from the Physical Access Control System and Database Management to the device.
5. Connect signal lines and AC power to the housing interfaces.
6. Connect pole wiring harness to camera.

3.3 SYSTEM START-UP

A. The Contractor shall not apply power to the VASS System until the following items have been completed:
   1. VASS System equipment items and have been set up in accordance with manufacturer's instructions.
   2. A visual inspection of the VASS System has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   3. System wiring has been tested and verified as correctly connected as indicated.
   4. All system grounding and transient protection systems have been verified as installed and connected as indicated.
   5. Power supplies to be connected to the VASS System have been verified as the correct voltage, phasing, and frequency as indicated.

B. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.

3.4 SUPLEMENTAL CONTRACTOR QUIALITY CONTROL

A. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed VASS System; and are approved by the Contracting Officer.

B. The Contractor shall be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.

C. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.

D. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.5 DEMONSTRATION AND TRAINING

A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, “GENERAL REQUIREMENTS”.

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SECTION 28 31 00
FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section of the specifications includes the furnishing, installation, and connection of the fire alarm equipment to form a complete coordinated system ready for operation. It shall include; alarm initiating devices, alarm notification appliances, control units, fire safety control devices, power supplies and wiring as shown on the drawings and specified. The fire alarm system shall not be combined with other systems such as building automation, energy management, and security.

1.2 SCOPE

A. Provide new fire alarm equipment for the elevators , and shall be designed and installed in accordance with the specifications and drawings. Device location and wiring runs shown on the drawings are for reference only unless specifically dimensioned. Actual locations shall be in accordance with NFPA 72 and this specification.

B. The contractor shall verify that the existing Simplex fire alarm system is operational, and the contractor shall test the fire alarm system after the new devices are installed.

C. The contactor shall engage the services of the existing Simplex Fire Alarm maintenance company as part of their work to perform device terminations and any programming needed for the new elevators.

D. Provide new NAC/Transponder fire alarm panel in the elevator penthouse for the elevator room and elevator equipment recall modules and connect to the existing Simplex fire alarm panel.

E. All existing fire alarm equipment, wiring, devices and sub-systems that are not shown to be reused shall be removed. All existing fire alarm conduit not reused shall be removed.

F. Existing fire alarm bells, chimes, door holders, 120VAC duct smoke detectors, valve tamper switches and waterflow/pressure switches may be reused only as specifically indicated on the drawings and provided the equipment:

1. Meets this specification section
2. Is UL listed or FM approved
3. Is compatible with new equipment being installed
4. Is verified as operable through contractor testing and inspection

5. Is warranted as new by the contractor.

G. Existing reused equipment shall be covered as new equipment under the Warranty specified herein.

H. Verify that the existing fire alarm system is operational before start of new work.

I. Contractor/vendor/manufacturer shall make the final fire alarm terminations of the new fire alarm devices.

J. Basic Performance:

1. Alarm and trouble signals from each building fire alarm control panel shall be digitally encoded by UL listed electronic devices onto a multiplexed communication system.
2. Response time between alarm initiation (contact closure) and recording at the main fire alarm control unit (appearance on alphanumeric read out) shall not exceed 5 seconds.
3. The signaling line circuits (SLC) between building fire alarm control units shall be wired Class B in accordance with NFPA 72. Isolation shall be provided so that no more than one building can be lost due to a short circuit fault.
4. Initiating device circuits (IDC) shall be wired Class B in accordance with NFPA 72.
5. Signaling line circuits (SLC) within buildings shall be wired Class B in accordance with NFPA 72. Individual signaling line circuits shall be limited to covering 22,500 square feet (2,090 square meters) of floor space or 3 floors whichever is less.
6. Notification appliance circuits (NAC) shall be wired Class B in accordance with NFPA 72.

K. Existing Fire Protection:

1. Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections.
2. Provide fire watch for impairments more than 4 hours in a 24-hour period.
3. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with COR or Government Designated Authority.

4. Provide one pull station, strobe at 110cd and speaker at 2 watt in the construction area and connect to the existing fire alarm system, coordinate location with COR.
5. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center.
   a. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the COR.

1.3 RELATED WORK

A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Requirements for procedures for submittals.
B. Section 07 84 00 - FIRESTOPPING. Requirements for fire proofing wall penetrations.
C. Section 28 05 00 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY. Requirements for general requirements that are common to more than one section in Division 28.
D. Section 28 05 13 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for conductors and cables.
E. Section 28 05 26 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Requirements for grounding of equipment.
F. Section 28 05 28.33 - CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY. Requirements for infrastructure.
G. Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS (PACS). Requirements for integration with physical access control system.

1.4 SUBMITTALS

A. General: Submit 5 copies in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
B. Drawings:
   1. Prepare drawings using AutoCAD latest Release software and include all contractors information. Layering shall be by VA criteria as provided by the Contracting Officer Representative (COR). Bid drawing files on AutoCAD shall be provided to the Contractor at the pre-construction meeting. The contractor shall be responsible for verifying all critical dimensions shown on the drawings provided by VA.

2. Floor plans: Provide locations of all devices (with device number at each addressable device corresponding to control unit programming), appliances, panels, equipment, junction/terminal cabinets/boxes, risers, electrical power connections, individual circuits and raceway routing, system zoning; number, size, and type of raceways and conductors in each raceway; conduit fill calculations with cross section area percent fill for each type and size of conductor and raceway. Only those devices connected and incorporated into the final system shall be on these floor plans. Do not show any removed devices on the floor plans. Show all interfaces for all fire safety functions.
3. Riser diagrams: Provide, for the entire system, the number, size and type of riser raceways and conductors in each riser raceway and number of each type device per floor and zone. Show door holder interface, elevator control interface, HVAC shutdown interface, fire extinguishing system interface, and all other fire safety interfaces. Show wiring Styles on the riser diagram for all circuits. Provide diagrams both on a per building and campus wide basis.
4. Detailed wiring diagrams: Provide for control panels, modules, power supplies, electrical power connections, auxiliary relays and annunciators showing termination identifications, size and type conductors, circuit boards, LED lamps, indicators, adjustable controls, switches, ribbon connectors, wiring harnesses, terminal strips and connectors, spare zones/circuits, battery and battery calculations. Diagrams shall be drawn to a scale sufficient to show spatial relationships between components, enclosures and equipment configuration.
5. Two weeks prior to final inspection, the Contractor shall deliver to the COR 3 sets of as-built drawings and one set of the as-built drawing computer files (using AutoCAD latest release) . As-built drawings (floor plans) shall show all new and/or existing conduit used for the fire alarm system.

C. Manuals:

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets for all items used in the system, power requirements, device

wiring diagrams, dimensions, and information for ordering replacement parts.

a. Wiring diagrams shall have their terminals identified to facilitate installation, operation, expansion and maintenance.
b. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
c. Include complete listing of all software used and installation and operation instructions including the input/output matrix chart.
d. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate, inspect, test and maintain the equipment and system. Provide all manufacturer's installation limitations including circuit length limitations.
e. Complete listing of all digitized voice messages.
f. Provide standby battery calculations under normal operating and alarm modes. Battery calculations shall include the magnets for holding the doors open for one minute.
g. Include information indicating who will provide emergency service and perform post contract maintenance.
h. Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
i. A computerized preventive maintenance schedule for all equipment. The schedule shall be provided on disk in a computer format acceptable to the VAMC and shall describe the protocol for preventive maintenance of all equipment. The schedule shall include the required times for systematic examination, adjustment and cleaning of all equipment. A print out of the schedule shall also be provided in the manual. Provide the disk in a pocket within the manual.
j. Furnish manuals in 3 ring loose-leaf binder or manufacturer's standard binder.
k. A print out for all devices proposed on each signaling line circuit with spare capacity indicated.

2. Two weeks prior to final inspection, deliver 4 copies of the final updated maintenance and operating manual to the COR.
   a. The manual shall be updated to include any information necessitated by the maintenance and operating manual approval.
   b. Complete "As installed" wiring and schematic diagrams shall be included that shows all items of equipment and their interconnecting wiring. Show all final terminal identifications.
   c. Complete listing of all programming information, including all control events per device including an updated input/output matrix.
   d. Certificate of Installation as required by NFPA 72 for each building. The certificate shall identify any variations from the National Fire Alarm Code.
   e. Certificate from equipment manufacturer assuring compliance with all manufacturers installation requirements and satisfactory system operation.

D. Certifications:
   1. Together with the shop drawing submittal, submit the technician's NICET level III fire alarm certification as well as certification from the control unit manufacturer that the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include in the certification the names and addresses of the proposed supervisor of installation and the proposed performer of contract maintenance. Also include the name and title of the manufacturer’s representative who makes the certification.
   2. Together with the shop drawing submittal, submit a certification from either the control unit manufacturer or the manufacturer of each component (e.g., smoke detector) that the components being furnished are compatible with the control unit.
   3. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL and NFPA 72 requirements.

1.5 WARRANTY

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of

one year from the date of acceptance of the entire installation by the Contracting Officer.

1.6 GUARANTY PERIOD SERVICES

A. Complete inspection, testing, maintenance and repair service for the fire alarm system shall be provided by a factory trained authorized representative of the manufacturer of the major equipment for a period of 5 years from the date of acceptance of the entire installation by the Contracting Officer.

B. Contractor shall provide all necessary test equipment, parts and labor to perform required inspection, testing, maintenance and repair.

C. All inspection, testing, maintenance and permanent records required by NFPA 72, and recommended by the equipment manufacturer shall be provided by the contractor. Work shall include operation of sprinkler system alarm and supervisory devices It shall include all interfaced equipment including; elevators, HVAC shutdown, and extinguishing systems.

D. Maintenance and testing shall be performed in accordance with NFPA 72. A computerized preventive maintenance schedule shall be provided and shall describe the protocol for preventive maintenance of equipment. The schedule shall include a systematic examination, adjustment and cleaning of all equipment.

E. Non-included Work: Repair service shall not include the performance of any work due to improper use, accidents, or negligence for which the contractor is not responsible.

F. Service and emergency personnel shall report to the Engineering Office or their authorized representative upon arrival at the hospital and again upon the completion of the required work. A copy of the work ticket containing a complete description of the work performed and parts replaced shall be provided to the VA Contracting Officer’s Representative COR or his authorized representative.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by the basic designation only and the latest editions of these publications shall be applicable.

B. National Fire Protection Association (NFPA):

NFPA 13.....Standard for the Installation of Sprinkler Systems, 2019 edition

NFPA 14 .....Standard for the Installation of Standpipes and Hose Systems, 2019 edition

NFPA 20.....Standard for the Installation of Stationary Pumps for Fire Protection, 2019 edition

NFPA 70.....National Electrical Code (NEC), 2020 edition

NFPA 72.....National Fire Alarm Code, 2019 edition

NFPA 90A.....Standard for the Installation of Air Conditioning and Ventilating Systems, 2018 edition

NFPA 101.....Life Safety Code, 2018 edition

C. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment Directory

D. Factory Mutual Research Corp (FM): Approval Guide, 2007-2011

E. American National Standards Institute (ANSI):

S3.41.....Audible Emergency Evacuation Signal, 1990 edition, reaffirmed 2008

F. International Code Council, International Building Code (IBC), 2009 edition.

G. VA fire protection design manual December 2015

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS, GENERAL

A. All equipment and components shall be new and the manufacturer's current model. All equipment shall be tested and listed by Underwriters Laboratories, Inc. or Factory Mutual Research Corporation for use as part of a fire alarm system. The authorized representative of the manufacturer of the major equipment shall certify that the installation complies with all manufacturers' requirements and that satisfactory total system operation has been achieved.

2.2 CONDUIT, BOXES, AND WIRE

A. Conduit shall be in accordance with Section 28 05 28.33 CONDUIT AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY and as follows:

1. All new conduits shall be installed in accordance with NFPA 70.
2. Conduit fill shall not exceed 40 percent of interior cross-sectional area.

3. All new conduits shall be 3/4-inch (19 mm) minimum.
4. Fire alarm conduits shall be factory painted “RED”.
5. All fire alarm boxes, pull boxes, cover plates shall be factory painted “RED” and shall be labeled “Fire Alarm”.

B. Wire:

1. Wiring shall be in accordance with NEC article 760, Section 28 05 13, CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY, and as recommended by the manufacturer of the fire alarm system. All wires shall be color coded. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and 14 AWG for notification device circuits.
2. Any fire alarm system wiring that extends outside of a building shall have additional power surge protection to protect equipment from physical damage and false signals due to lightning, voltage and current induced transients. Protection devices shall be shown on the submittal drawings and shall be UL listed or in accordance with written manufacturer's requirements.
3. All wire or cable used in underground conduits including those in concrete shall be listed for wet locations.

C. Terminal Boxes, Junction Boxes, and Cabinets:

1. Shall be galvanized steel in accordance with UL requirements.
2. All boxes shall be sized and installed in accordance with NFPA 70.
3. Covers shall be repainted red in accordance with Section 09 91 00, PAINTING and shall be identified with white markings as "FA" for junction boxes and as "FIRE ALARM SYSTEM" for cabinets and terminal boxes. Lettering shall be a minimum of 3/4 inch (19 mm) high.
4. Terminal boxes and cabinets shall have a volume 50 percent greater than required by the NFPA 70. Minimum sized wire shall be considered as 14 AWG for calculation purposes.
5. Terminal boxes and cabinets shall have identified pressure type terminal strips and shall be located at the base of each riser. Terminal strips shall be labeled as specified or as approved by the COR.

2.3 FIRE ALARM CONTROL UNIT

A. General:

1. Provide new fire alarm NAC panel to match the existing Simplex system.
2. Each power source shall be supervised from the other source for loss of power.
3. All circuits shall be monitored for integrity.
4. Visually and audibly annunciate any trouble condition including; main power failure, grounds and system wiring derangement.
5. Transmit digital alarm information to the main fire alarm control unit.

B. Enclosure:

1. The control unit shall be housed in a cabinet suitable for both recessed and surface mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. Cabinet shall contain all necessary relays, terminals, lamps, and legend plates to provide control for the system.

C. Operator terminal at main control unit:

1. Operator terminal shall consist of the central processing unit, display screen, keyboard and printer.
2. Display screen shall have a minimum 15-inch (380 mm) diagonal non-glare screen capable of displaying 24 lines of 80 characters each.
3. Keyboard shall consist of 60 alpha numeric and 12 user/functional control keys.
4. Printer shall be the automatic type, printing the date, time and location for all alarm, supervisory, and trouble conditions.

D. Power Supply:

1. The control unit shall derive its normal power from a 120 volt, 60 Hz dedicated supply connected to the emergency power system. Standby power shall be provided by a 24 volt DC battery as hereinafter specified. The normal power shall be transformed, rectified, coordinated, and interfaced with the standby battery and charger.
2. The door holder power shall be arranged so that momentary or sustained loss of main operating power shall not cause the release of any door.
3. Power supply for smoke detectors shall be taken from the fire alarm control unit.

4. Provide protectors to protect the fire alarm equipment from damage due to lightning or voltage and current transients.
5. Provide new separate and direct ground lines to the outside to protect the equipment from unwanted grounds.

E. Circuit Supervision: Each alarm initiating device circuit, signaling line circuit, and notification appliance circuit, shall be supervised against the occurrence of a break or ground fault condition in the field wiring. These conditions shall cause a trouble signal to sound in the control unit until manually silenced by an off switch.

F. Supervisory Devices: All sprinkler system valves, standpipe control valves, post indicator valves (PIV), and main gate valves shall be supervised for off-normal position. Closing a valve shall sound a supervisory signal at the control unit until silenced by an off switch. The specific location of all closed valves shall be identified at the control unit. Valve operation shall not cause an alarm signal. Low air pressure switches and duct detectors shall be monitored as supervisory signals. The power supply to the elevator shunt trip breaker shall be monitored by the fire alarm system as a supervisory signal.

G. Trouble signals:
1. Arrange the trouble signals for automatic reset (non-latching).
2. System trouble switch off and on lamps shall be visible through the control unit door.

H. Function Switches: Provide the following switches in addition to any other switches required for the system:
1. Remote Alarm Transmission By-pass Switch: Shall prevent transmission of all signals to the main fire alarm control unit when in the "off" position. A system trouble signal shall be energized when switch is in the off position.
2. Alarm Off Switch: Shall disconnect power to alarm notification circuits on the local building alarm system. A system trouble signal shall be activated when switch is in the off position.
3. Trouble Silence Switch: Shall silence the trouble signal whenever the trouble silence switch is operated. This switch shall not reset the trouble signal.
4. Reset Switch: Shall reset the system after an alarm, provided the initiating device has been reset. The system shall lock in alarm until reset.

5. Lamp Test Switch: A test switch or other approved convenient means shall be provided to test the indicator lamps.
6. Elevator recall By-Pass Switch: Shall prevent the elevators from recalling upon operation of any of the devices installed to perform that function. A system trouble alarm shall be energized when the switch is in the abnormal position.

2.4 STANDBY POWER SUPPLY

A. Uninterrupted Power Supply (UPS):
1. The UPS system shall be comprised of a static inverter, a precision battery float charger, and sealed maintenance free batteries.
2. Under normal operating conditions, the load shall be filtered through a ferro resonant transformer.
3. When normal AC power fails, the inverter shall supply AC power to the transformer from the battery source. There shall be no break in output of the system during transfer of the system from normal to battery supply or back to normal.
4. Batteries shall be sealed, gel cell type.
5. UPS system shall be sized to operate the central processor, CRT, printer, and all other directly connected equipment for 5 minutes upon a normal AC power failure.

B. Batteries:
1. Battery shall be of the sealed, maintenance free type, 24-volt nominal.
2. Battery shall have sufficient capacity to power the fire alarm system for not less than 24 hours plus 5 minutes of alarm to an end voltage of 1.14 volts per cell, upon a normal AC power failure.
3. Battery racks shall be steel with an alkali-resistant finish. Batteries shall be secured in seismic areas 2B, 3, or 4 as defined by the Uniform Building Code.
4. Contractor shall provide battery calculation as part of the shop drawings.

C. Battery Charger:
1. Shall be completely automatic, with constant potential charger maintaining the battery fully charged under all service conditions. Charger shall operate from a 120-volt, 60 hertz emergency power sources.

2. Shall be rated for fully charging a completely discharged battery within 48 hours while simultaneously supplying any loads connected to the battery.
3. Shall have protection to prevent discharge through the charger.
4. Shall have protection for overloads and short circuits on both AC and DC sides.
5. A trouble condition shall actuate the fire alarm trouble signal.
6. Charger shall have automatic AC line voltage regulation, automatic current-limiting features, and adjustable voltage controls.

2.5 VOICE COMMUNICATION SYSTEM (VCS)

A. General:

1. An emergency voice communication system shall be installed throughout
2. Upon receipt of an alarm signal from the building fire alarm system, the VCS shall automatically transmit a pre-recorded fire alarm message
3. A digitized voice module shall be used to store each prerecorded message.
4. The VCS shall be arranged as a dual channel system capable of transmitting 2 different messages simultaneously single channel system.
5. The VCS shall supervise all speaker circuits, control equipment, remote audio control equipment, and amplifiers.

B. Speaker Circuit Control Unit:

1. The speaker circuit control unit shall include switches to manually activate or deactivate speaker circuits grouped by floor in the system.
2. Speaker circuit control switches shall provide on, off, and automatic positions and indications.
3. The speaker circuit control unit shall include visual indication of active or trouble status for each group of speaker circuits in the system.
4. A trouble indication shall be provided if a speaker circuit group is disabled.
5. A lamp test switch shall be provided to test all indicator lamps.
6. A single "all call" switch shall be provided to activate all speaker circuit groups simultaneously.

7. A push-to-talk microphone shall be provided for manual voice messages.
8. A voice message disconnect switch shall be provided to disconnect automatic digitized voice messages from the system. The system shall be arranged to allow manual voice messages and indicate a system trouble condition when activated.

C. Speaker Circuit Arrangement:

1. Speaker circuits shall be arranged such that there is one speaker circuit per smoke zone.
2. Audio amplifiers and control equipment shall be electrically supervised for normal and abnormal conditions.
3. Speaker circuits shall be either 25 VRMS or 70.7 VRMS with a minimum of 50 percent spare power available.
4. Speaker circuits and control equipment shall be arranged such that loss of any one speaker circuit will not cause the loss of any other speaker circuit in the system.

D. Digitized Voice Module (DVM):

1. The Digitized Voice Module shall provide prerecorded digitized evacuation and instructional messages. The messages shall be professionally recorded and approved by the COR prior to programming.
2. The DVM shall be configured to automatically output to the desired circuits following a 10-second slow whoop alert tone.
3. Prerecorded magnetic taped messages and tape players are not permitted.
4. The digitized message capacity shall be no less than 15 second in length.
5. The digitized message shall be transmitted 3 times.
6. The DVM shall be supervised for operational status.
7. Failure of the DVM shall result in the transmission of a constant alarm tone.
8. The DVM memory shall have a minimum 50 percent spare capacity after those messages identified in this section are recorded. Multiple DVM's may be used to obtain the required capacity.

E. Audio Amplifiers:

1. Audio Amplifiers shall provide a minimum of 50 Watts at either 25 or 70.7 VRMS output voltage levels.

2. Amplifiers shall be continuously supervised for operational status.
3. Amplifiers shall be configured for either single or dual channel application.
4. Each audio output circuit connection shall be configurable for Style X.
5. A minimum of 50 percent spare output capacity shall be available for each amplifier.

F. Tone Generator(s):

1. Tone Generator(s) shall be capable of providing a distinctive 3-pulse temporal pattern fire alarm signal as well as a slow whoop.
2. Tone Generator(s) shall be continuously supervised for operational status.

2.6 ALARM NOTIFICATION APPLIANCES

A. Speakers:

1. Shall operate on either 25 VRMS or 70.7 VRMS with field selectable output taps from 0.5 to 2.0W and originally installed at the 1/2 watt tap. Speakers shall provide a minimum sound output of 80 dBA at 10 feet (3,000 mm) with the 1/2 watt tap.
2. Frequency response shall be a minimum of 400 HZ to 4,000 HZ.
3. Four inches (100 mm) or 8 inches (200 mm) cone type speakers ceiling mounted with white colored baffles in areas with suspended ceilings and wall mounted in areas without ceilings.

B. Strobes:

1. Xenon flash tube type minimum 15 candela in toilet rooms and 75 candela in all other areas with a flash rate of 1 HZ. Strobes shall be synchronized where required by the National Fire Alarm Code (NFPA 72).
2. Backplate shall be red with 1/2 inch (13 mm) permanent red letters. Lettering to read "Fire", be oriented on the wall or ceiling properly, and be visible from all viewing directions.
3. Each strobe circuit shall have a minimum of 20 percent spare capacity.
4. Strobes may be combined with the audible notification appliances specified herein.
5. Strobe shall have 15, 35, 75, 90, 110, 150 and 170 candelas and shall be field adjustable.

2.7 ALARM INITIATING DEVICES

A. Manual Fire Alarm Stations:

1. Shall be non-breakglass, address reporting type.
2. Station front shall be constructed of a durable material such as cast or extruded metal or high impact plastic. Stations shall be semi-flush type.
3. Stations shall be of dual action pull down type with suitable operating instructions provided on front in raised or depressed letters, and clearly labeled "FIRE."
4. Operating handles shall be constructed of a durable material. On operation, the lever shall lock in alarm position and remain so until reset. A key shall be required to gain front access for resetting or conducting tests and drills.
5. Unless otherwise specified, all exposed parts shall be red in color and have a smooth, hard, durable finish.

B. Smoke Detectors:

1. Smoke detectors shall be photoelectric type and UL listed for use with the fire alarm control unit being furnished.
2. Smoke detectors shall be addressable type complying with applicable UL Standards for system type detectors. Smoke detectors shall be installed in accordance with the manufacturer's recommendations and NFPA 72.
3. Detectors shall have an indication lamp to denote an alarm condition. Provide remote indicator lamps and identification plates where detectors are concealed from view. Locate the remote indicator lamps and identification plates flush mounted on walls so they can be observed from a normal standing position.
4. All spot type and duct type detectors installed shall be of the photoelectric type.
5. Photoelectric detectors shall be factory calibrated and readily field adjustable. The sensitivity of any photoelectric detector shall be factory set at 3.0 plus or minus 0.25 percent obscuration per foot.
6. Detectors shall provide a visual trouble indication if they drift out of sensitivity range or fail internal diagnostics. Detectors shall also provide visual indication of sensitivity level upon

testing. Detectors, along with the fire alarm control units shall be UL listed for testing the sensitivity of the detectors.

7. Provide combination smoke detectors base with carbon monoxide (CO) sounder in each patient bedroom as specified here and/or as shown on the drawings.

C. Heat Detectors:

1. Heat detectors shall be of the addressable restorable rate compensated fixed-temperature spot type.
2. Detectors shall have a minimum smooth ceiling rating of 2,500 square feet (230 square meters).
3. Ordinary temperature (135 degrees F (57 degrees C)) heat detectors shall be utilized in elevator shafts and elevator mechanical rooms. Intermediate temperature rated (200 degrees F (93 degrees C)) heat detectors shall be utilized in all other areas.
4. Provide a remote indicator lamp, key test station and identification nameplate (e.g. "Heat Detector - Elevator P-_____) for each elevator group. Locate key test station in plain view on elevator machine room wall.

D. Water Flow and Pressure Switches:

1. Wet pipe water flow switches and dry pipe alarm pressure switches for sprinkler systems shall be connected to the fire alarm system by way of an address reporting interface device.
2. All new water flow switches shall be of a single manufacturer and series and non-accumulative retard type. See Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS for new switches added. Connect all switches shown on the approved shop drawings.
3. All new switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds. Timing shall be recorded and documented during testing.

2.8 SUPERVISORY DEVICES

A. Duct Smoke Detectors:

1. Duct smoke detectors shall be provided and connected by way of an address reporting interface device. Detectors shall be provided with an approved duct housing mounted exterior to the duct and shall have perforated sampling tubes extending across the full

width of the duct (wall to wall). Detector placement shall be such that there is uniform airflow in the cross section of the duct.

2. Interlocking with fans shall be provided in accordance with NFPA 90A and as specified hereinafter under Part 3.2, "TYPICAL OPERATION".
3. Provide remote indicator lamps, key test stations and identification nameplates (e.g. "DUCT SMOKE DETECTOR AHU-X") for all duct detectors. Locate key test stations in plain view on walls or ceilings so that they can be observed and operated from a normal standing position.

B. Sprinkler and Standpipe System Supervisory Switches:

1. Each sprinkler system water supply control valve, riser valve or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valve shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected to the fire alarm system by way of address reporting interface device. See Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS for new switches to be added. Connect tamper switches for all control valves shown on the approved shop drawings.
4. The mechanism shall be contained in a weatherproof die-cast aluminum housing that shall provide a 3/4 inch (19 mm) tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting.
6. Where dry-pipe sprinkler systems are installed, high and low air pressure switches shall be provided and monitored by way of an address reporting interface devices.

2.9 ADDRESS REPORTING INTERFACE DEVICE

A. Shall have unique addresses that reports directly to the building fire alarm panel.

B. Shall be configurable to monitor normally open or normally closed devices for both alarm and trouble conditions.
C. Shall have terminal designations clearly differentiating between the circuit to which they are reporting from and the device that they are monitoring.
D. Shall be UL listed for fire alarm use and compatibility with the panel to which they are connected.
E. Shall be mounted in weatherproof housings if mounted exterior to a building.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Provide fire alarm devices per NFPA 72, VA fire protection design manual and connect all devices to new or existing fire alarm control panel.
B. Installation shall be in accordance with NFPA 70, 72, 90A, and 101 as shown on the drawings, and as recommended by the major equipment manufacturer. Fire alarm wiring shall be installed in conduit. All conduit and wire shall be installed in accordance with, Section 28 05 13 CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY, Section 28 05 26 GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY, Section 28 05 28.33 CONDUIT AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY, and all penetrations of smoke and fire barriers shall be protected as required by Section 07 84 00, FIRESTOPPING.
C. All conduits, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.
D. All new and reused exposed conduits shall be painted in accordance with Section 09 91 00, PAINTING to match surrounding finished areas and red in unfinished areas.
E. All existing accessible fire alarm conduit not reused shall be removed.
F. Existing devices that are reused shall be properly mounted and installed. Where devices are installed on existing shallow backboxes, extension rings of the same material, color and texture of the new fire alarm devices shall be used. Mounting surfaces shall be cut and patched in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Restoration, and be re-painted in accordance with Section 09 91 00, PAINTING as necessary to match existing.

G. All fire detection and alarm system devices, control units and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Exact locations are to be approved by the COR.
H. Speakers shall be ceiling mounted and fully recessed in areas with suspended ceilings. Speakers shall be wall mounted and recessed in finished areas without suspended ceilings. Speakers may be surface mounted in unfinished areas.
I. Strobes shall be flush wall mounted with the bottom of the unit located 80 inches (2,000 mm) above the floor or 6 inches (150 mm) below ceiling, whichever is lower. Locate and mount to maintain a minimum 36 inches (900 mm) clearance from side obstructions.
J. Manual pull stations shall be installed not less than 42 inches (1,050 mm) or more than 48 inches (1,200 mm) from finished floor to bottom of device and within 60 inches (1,500 mm) of a stairway or an exit door and shall be provided no more than 200 feet apart to meet NFPA.
K. Provide smoke detectors at each side of a fire rated doors.
L. Where possible, locate water flow and pressure switches a minimum of 12 inches (300 mm) from a fitting that changes the direction of the flow and a minimum of 36 inches (900 mm) from a valve.
M. Mount valve tamper switches so as not to interfere with the normal operation of the valve and adjust to operate within 2 revolutions toward the closed position of the valve control, or when the stem has moved no more than 1/5 of the distance from its normal position.
N. Connect flow and tamper switches installed under Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS.

3.2 TYPICAL OPERATION

A. Activation of any manual pull station, water flow or pressure switch, heat detector, kitchen hood suppression system, gaseous suppression system, or smoke detector shall cause the following operations to occur:
    1. Operate the emergency voice communication system in Buildings For sprinkler protected buildings, flash strobes continuously only in the zone of alarm. For buildings without sprinkler protection throughout, flash strobes continuously only on the floor of alarm.

2. Continuously sound a temporal pattern general alarm and flash all strobes in the building in alarm until reset at the local fire alarm control unit in Buildings
3. Unlock the electrically locked exit doors within the zone of alarm.

B. Heat detectors in elevator machine rooms shall, in addition to the above functions, disconnect all power to all elevators served by that machine room after a time delay. The time delay shall be programmed within the fire alarm system programming and be equal to the time it takes for the car to travel from the highest to the lowest level, plus 10 seconds.

C. Smoke detectors in the primary elevator lobbies of Buildings indicate the buildings where there is Phase I elevator recall shall, in addition to the above functions, return all elevators in the bank to the secondary floor.

D. Smoke detectors in the remaining elevator lobbies, elevator machine room, or top of hoistway shall, in addition to the above functions, return all elevators in the bank to the primary floor.

E. Operation of a smoke detector at a corridor door used for automatic closing shall also release only the magnetic door holders on that floor in that smoke zone

F. Operation of duct smoke detectors shall cause a system supervisory condition and shut down the ventilation system and close the associated smoke dampers as appropriate.

G. Operation of any sprinkler or standpipe system valve supervisory switch, high/low air pressure switch, or fire pump alarm switch shall cause a system supervisory condition.

H. Alarm verification shall not be used for smoke detectors installed for the purpose of early warning.

3.3 ELEVATOR REQUIREMENTS

A. At each elevator control panel provide addressable Interface relay modules within 3 feet of the elevator controller for:
   1. Primary recall
   2. Alternative Recall.
   3. In cab notifications.
   4. Emergency shunt.
   5. Emergency shunt power supervision.

B. At each elevator lobby provide photoelectric smoke detector.

C. In the elevator equipment room provide Smoke and Heat detector within 24 inches of sprinkler head.

D. In each Elevator shaft provide heat detector.

E. Coordinate work with the elevator contractor/vendor/manufacturer.

3.4 TESTS

A. Provide the service of a NICET level III, competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. Make all adjustments and tests in the presence of the COR.

B. When the systems have been completed and prior to the scheduling of the final inspection, furnish testing equipment and perform the following tests in the presence of the COR. When any defects are detected, make repairs or install replacement components, and repeat the tests until such time that the complete fire alarm systems meets all contract requirements. After the system has passed the initial test and been approved by the COR, the contractor may request a final inspection.

C. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

1. Test the insulation on all installed cable and wiring by standard methods as recommended by the equipment manufacturer.
2. Run water through all flow switches. Check time delay on water flow switches. Submit a report listing all water flow switch operations and their retard time in seconds.
3. Open each alarm initiating and notification circuit to see if trouble signal actuates.
4. Ground each alarm initiation and notification circuit and verify response of trouble signals.

3.5 FINAL INSPECTION AND ACCEPTANCE

A. Prior to final acceptance a minimum 30 day "burn-in" period shall be provided. The purpose shall be to allow equipment to stabilize and potential installation and software problems and equipment malfunctions to be identified and corrected. During this diagnostic period, all system operations and malfunctions shall be recorded. Final acceptance will be made upon successful completion of the "burn-in" period and where the last 14 days is without a system or equipment malfunction.

B. At the final inspection a factory trained representative of the manufacturer of the major equipment shall repeat the tests in Article 3.3 TESTS and those required by NFPA 72. In addition, the representative shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of a COR.

3.6 INSTRUCTION

A. The manufacturer's authorized representative shall provide instruction and training to the VA as follows:
   1. Six 1-hour sessions to engineering staff, security police and central attendant personnel for simple operation of the system. Two sessions at the start of installation, 2 sessions at the completion of installation and 2 sessions 3 months after the completion of installation.
   2. Four 2-hour sessions to engineering staff for detailed operation of the system. Two sessions at the completion of installation and 2 sessions 3 months after the completion of installation.

B. The Contractor and/or the Systems Manufacturer's representative shall provide a typewritten "Sequence of Operation" including a trouble shooting guide of the entire system for submittal to the VA. The sequence of operation will be shown for each input in the system in a matrix format and provided in a loose-leaf binder. When reading the sequence of operation, the reader will be able to quickly and easily determine what output will occur upon activation of any input in the system. The INPUT/OUTPUT matrix format shall be as shown in Appendix A to NFPA 72.

C. Furnish the services of a competent instructor for instructing personnel in the programming requirements necessary for system expansion. Such programming shall include addition or deletion of devices, zones, indicating circuits and printer/display text.

---END---

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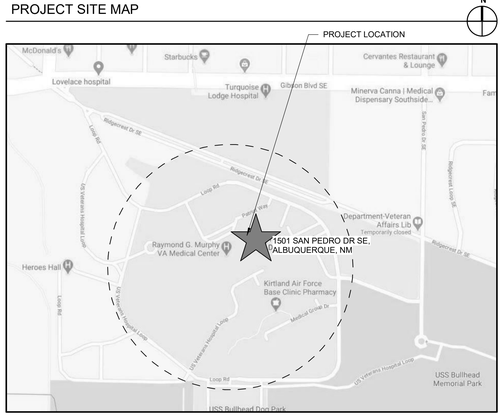
REPAIR-REPLACE ELEVATORS IN B-41

1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

VA PROJECT #: 501-19-101 APOGEE PROJECT #: 19-262

PROJECT SITE MAP



PROJECT LOCATION MAP

PROJECT IMAGE

DRAWING LIST

GENERAL			
G-001	COVER	1	12
G-002	CAMPUS MAP	2	12
G-003	PRE CONSTRUCTION RISK ASSESSMENT (PCRA)	3	12
G-004	INFECTION CONTROL RISK ASSESSMENT (ICRA)	4	12
G-100	BLDG 41 OVERALL BASEMENT FLOOR PLAN	5	12
G-101	BLDG 41 OVERALL FIRST FLOOR PLAN	6	12
G-102	BLDG 41 OVERALL SECOND FLOOR PLAN	7	12
G-103	BLDG 41 OVERALL THIRD FLOOR PLAN	8	12
G-104	BLDG 41 OVERALL FOURTH FLOOR PLAN	9	12
G-105	BLDG 41 OVERALL FIFTH FLOOR PLAN	10	12
G-106	BLDG 41 OVERALL SIXTH FLOOR PLAN	11	12
G-107	BLDG 41 OVERALL PENTHOUSE PLAN	12	12
ARCHITECTURAL			
A-001	ARCHITECTURAL SYMBOLS, ABBREVIATIONS AND NOTES	1	6
A-100	BLDG 41 ENLARGED ELEVATOR P-1, P-2, P-3, P-4, S-1, S-2, S-3, S-4 PLANS AND DETAILS	2	6
A-101	BLDG 41 S-5 ENLARGED ELEVATOR PLANS AND T-4 ENLARGED DUMBWAITER PLANS	3	6
A-301	SCHEMATIC ELEVATOR SECTIONS AND DETAILS	4	6
A-401	TYPICAL PASSENGER ELEVATOR PLANS, ELEVATIONS, DETAILS AND FINISHES	5	6
A-402	TYPICAL SERVICE ELEVATOR PLANS, ELEVATIONS, AND FINISHES	6	6
FIRE PROTECTION			
FX001	FIRE PROTECTION GENERAL INFORMATION	1	3
FX101	BLDG 41 PENTHOUSE FIRE PROTECTION PLAN	2	3
FX102	BLDG 41 6TH FLOOR FIRE PROTECTION PLAN	3	3
PLUMBING			
P-001	PLUMBING GENERAL INFORMATION	1	2
P-401	ENLARGED PLUMBING PLANS	2	2
MECHANICAL			
M-001	MECHANICAL GENERAL INFORMATION	1	6
M-100	BLDG 41 BASEMENT HVAC PLAN	2	6
M-107	BLDG 41 PENTHOUSE HVAC PLAN	3	6
M-401	ENLARGED MECHANICAL PLANS	4	6
M-501	MECHANICAL DETAILS	5	6
M-502	MECHANICAL CONTROLS	6	6
ELECTRICAL			
E-001	ELECTRICAL GENERAL NOTES, SYMBOL LEGENDS, AND ABBREVIATIONS	1	11
E-002	TECHNOLOGY GENERAL NOTES, SYMBOL LEGENDS, AND ABBREVIATIONS	2	11
ED107	BLDG 41 ELEVATOR PENTHOUSE DEMOLITION PLAN	3	11
E-100	BLDG 41 QUADRANT C BASEMENT FLOOR PLAN	4	11
E-102	BLDG 41 QUADRANT B 2ND FLOOR PLAN	5	11
E-107	BLDG 41 ELEVATOR PENTHOUSE POWER PLAN	6	11
E-301	ELECTRICAL HOISTWAY AND ELEVATIONS	7	11
E-401	ROOM DETAILS	8	11
E-501	ELECTRICAL DETAILS	9	11
E-601	ONE-LINE DIAGRAMS	10	11
E-602	ELECTRICAL SCHEDULES	11	11
FIRE ALARM			
FA001	FIRE ALARM GENERAL NOTES, SYMBOL LEGEND, AND ABBREVIATIONS	1	3
FA101	BLDG 41 ELEVATOR S-5 SHAFT FIRE ALARM PLAN	2	3
FA107	BLDG 41 ELEVATOR PENTHOUSE FIRE ALARM PLAN	3	3

PRIORITY OF WORK

- FIRST PRIORITY - BUILDING 41, DUMBWAITER T-4
- SECOND PRIORITY - ALL OTHER ELEVATORS IN BUILDING 41 THAT ARE IN SCOPE OF WORK.

COORDINATE WITH COR THE SEQUENCE AND NUMBER OF ELEVATORS TO BE WORKED ON.

NOTE: THE A/E OF RECORD FOR THE NEW MEXICO VA HEALTHCARE SYSTEM ON PROJECT 501-19-101, LOCATED IN ALBUQUERQUE, NEW MEXICO CAN CERTIFY THAT NO ASBESTOS CONTAINING BUILDING MATERIALS (ACBM) OR LEAD BASED PRODUCTS WERE DESIGNED AND/OR SPECIFIED IN THE DESIGN.

THERE IS EXISTING ASBESTOS CONTAINING MATERIAL IN THE PROJECT WHICH IS BEING ABATED AS A PART OF THIS PROJECT. NO ACBM PRODUCTS WERE DESIGNED AND/OR SPECIFIED AS A PART OF NEW WORK BEING PERFORMED.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO — WALTER DAVID VANSCOTER — ARC.1716954 — REGISTERED ARCHITECT — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: COVER

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: NPM

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Drawing Number: G-001

Dwg 1 of 12

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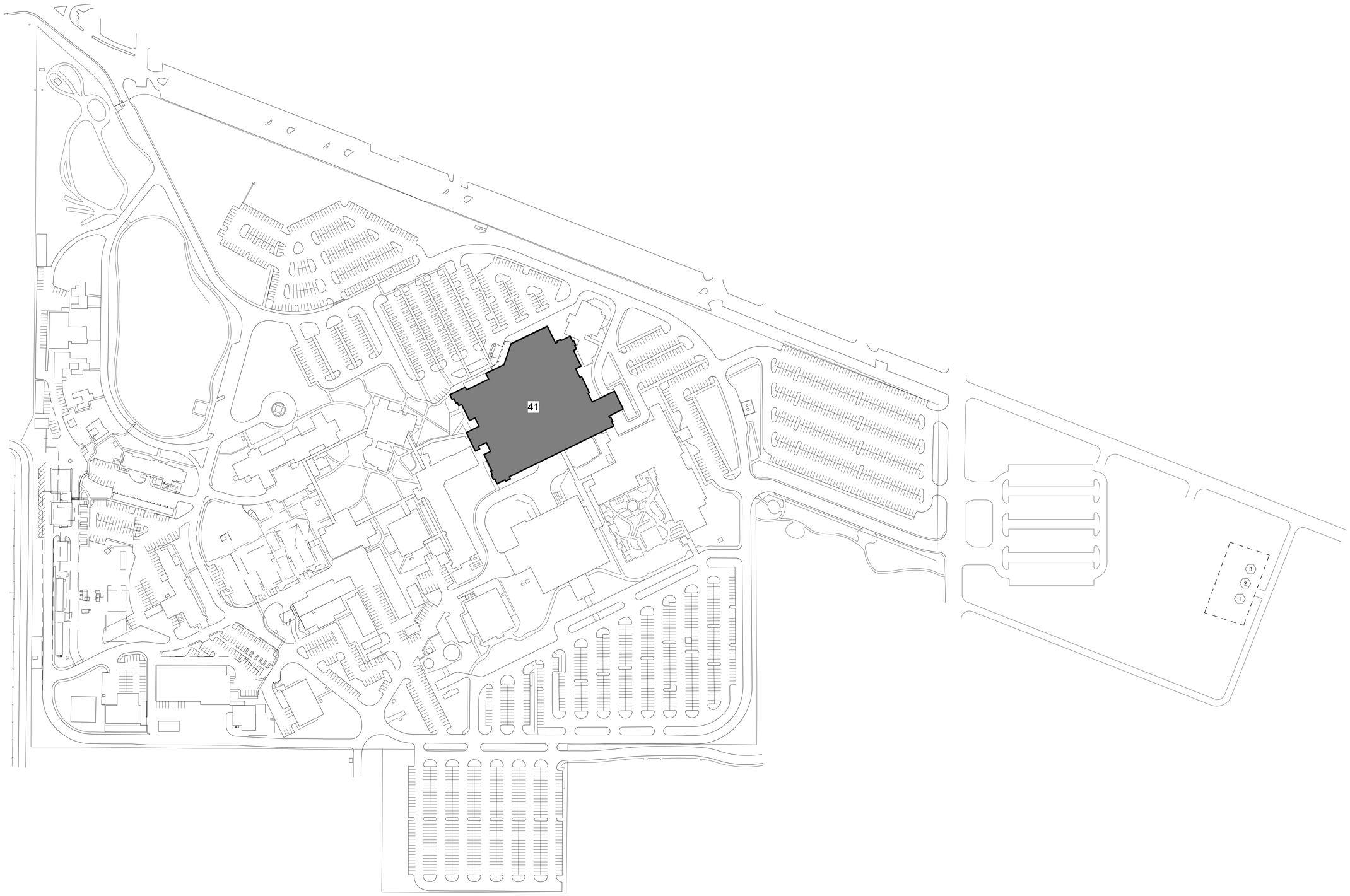

SHEET NOTES:

1. CONTRACTOR TO VERIFY PARKING LOCATIONS AND RESTRICTIONS WITH VA AND C.O.R.
2. CONTRACTOR PARKING AREA. CONTRACTOR TO PROVIDE TRANSPORTATION TO AND FROM PARKING AREA TO HOSPITAL. EQUIPMENT DELIVERY TO TAKE PLACE AT BUILDING 41.
3. CONTRACTOR TO COORDINATE STAGING/LAYDOWN AREA WITH VA AND C.O.R.
4. CONTRACTOR TO VERIFY BADGING REQUIREMENTS WITH VA AND C.O.R. PRIOR TO SUBMITTING BID.

SITE PLAN GRAPHIC LEGEND

BUILDINGS IN SCOPE

41 BUILDING 41

(##) KEY NOTES:

1 CONTRACTOR PARKING AREA. EQUIPMENT DELIVERY TO TAKE PLACE AT BUILDING 41.

2 CONTRACTOR TO PROVIDE MINIMUM 1 TEMPORARY RESTROOM FACILITY IN THIS AREA FOR THE DURATION OF CONSTRUCTION PERIOD. VA WILL DESIGNATE RESTROOMS FOR USE FOR CONSTRUCTION WORKERS AT BLDG 41.

3 CONTRACTOR MAY USE THIS AREA FOR STAGING/LAYDOWN.

1 CAMPUS MAP
Scale: No Scale

NORTH

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: CAMPUS MAP

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number G-002

Dwg 2 of 12

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NFPA 101 - CHAPTER 43 BUILDING REHABILITATION

43.1.1 CLASSIFICATION OF REHABILITATION WORK - RENOVATION

43.4.2 CAPACITY OF MEANS OF EGRESS. THIS PROJECT DOES NOT CHANGE OR ALTER EXISTING OCCUPANT LOAD OR MEANS OF EGRESS. THE EGRESS CAPACITY SHALL HAVE BEEN PREVIOUSLY APPROVED AS BEING ADEQUATE.

Pre-Construction Risk Assessment
Infection Control / Safety Construction Permit

Project Title and Number: REPAIR-REPLACE ELEVATORS 501-19-101	Project Start Date: TBD
Project COR: WARREN BATTISTE	Estimated Duration: TBD
Contractor Performing Work: TBD	Location of Construction: NEW MEXICO
Superintendent:	COR Telephone:
Description of project: MODERNIZATION OF ELEVATORS P-1 THRU P-4 AND S-1 THRU S-4 AND DUMBWAITER T-4 IN BUILDING 41.	

Construction Activities

The following must be addressed and put in place prior to any construction activities:
- Fire Seal All Penetrations
- Separation wall must be constructed prior to project beginning, or secure an existing barrier. Contractor shall consider need for plastic or hard barriers and consider sprinkler heads and smoke detector requirements.
- Contractor shall place all construction signage needed for the project.
- Fire protection systems must remain intact.
- Provide extra fire extinguishers in the work areas.
- Maintain exit lights in work area.
- Maintain negative air in construction area (24/7) through duration of project when necessary.
- There cannot be any return air from within the construction area to the rest of the building.
- Ensure public exiting does not go through the construction area.
- Maintain daily logs, daily hot work permits, daily confined entry permit, etc.
- Place sticky mats at doors exiting construction area. (Inside and Outside Entrance to Site)
- All debris must be removed by covered cart on a daily basis.
- Maintain clean and orderly work area on a daily basis.
- Activity Hazard Analysis (AHA), and Safety Plan required from all contractors.
- The COR shall perform a site walk-through & document pre-construction condition, note equipment to track/ move. Ensure all doors are functioning correctly.

Yes	No	
■		**Will there be noise generated that will impact a department adjacent to, above, or below the construction area?**
■		a. If so, these departments must be notified.
■		b. How are you going to reduce the noise to an acceptable level?
Yes	No	**Will there be vibration generated that will impact a department adjacent to, above, or below the construction area?**
	■	a. If so, these departments must be notified each time this type of work will be performed.
	■	b. How are you going to reduce the vibration to an acceptable level?
Yes	No	**Are Emergency Procedures in place and posted on each job for accidental events that could greatly impact Patient Care or Life Safety to the facility? Included in these procedures are such things as:**
■		• Emergency telephone numbers of key departments. • A plan that describes where main valves, switches, and controls are for the area in case of an emergency. • A plan for unexpected outages.
		Environment
Yes	No	**Are any of the following environmental hazards present?**
	■	Will hazardous chemicals be used on this project? How will fumes and odors be controlled? ***SDS Sheets are required.***
■		Is asbestos abatement required on this job? ***If so, notify Safety and Maintenance at the activation.***
■		Will there be hot work done on this project? If there are, then a hot work permit must be posted on the job site. All hot work must have a fire watch assigned to each area while the hot work is being performed.
■		Will there be a Confined Space Entry required on this project? If so, the CAMC confined space entry program must be followed.
	■	Contractor shall follow all requirements for concrete demolition and precaution for silica dust hazard.
Yes	No	**Utility Outages - Will any of the following systems be out of service at any time during the project?**
	■	• Fire alarm ***(If out for more than 4 hours, Interim Life Safety Measures must be implemented.)***
	■	• Sprinkler ***(If out for more than 4 hours, Interim Life Safety Measures must be implemented.)***
■		• Electrical
	■	• Domestic water
	■	• Oxygen
	■	• Sewage
■		• HVAC
Yes	No	**Will there be any work that will require activation of the Interim Life Safety Measures during this project? Some things that will ILSM's to be implemented are but not limited to:**
■		• Any construction that impacts an EXIT or stairs, • Any construction that impacts major breaches in a fire or smoke wall, • Taking the main fire protection system out of service (sprinkler), • Taking the main fire alarm system out of service. • Taking the "area" fire or fire alarm systems out of service for more than 4 hours within a 24-hour period.
■		**Implementation of the ILSM requires a fire watch and the ILSM forms to be completed.**

Yes	No	**Additional Safety Concerns**
	■	Will construction affect exit routes from occupied areas adjacent to construction site?
	■	Will project affect traffic patterns in area? ***If yes, explain plan.***
		The following must be completed prior to any construction activities.
■		• Separation wall must be constructed prior to project beginning. • Fire protection systems must remain intact. • Provide extra fire extinguishers in work areas. • Maintain exit lights in work area. • Maintain negative air in construction area (24/7) through duration of project. • There cannot be any return air from within the construction area to the rest of the building. • Redirect exiting not to go through construction area. • Put signs on doors into construction area "Construction Area – Do Not Enter". • Maintain daily logs and keep a current Hot Work Permit. • Place sticky mats at doors exiting construction area. • All debris removal must be by covered cart. • Maintain clean and orderly work area. • How will this project affect the departments above, below and adjacent to this project?

Air Quality and Infection Control

The construction activity types are defined by the amount of dust that is generated, the duration of the activity, and the amount of shared HVAC systems. Contact CAMC 's Safety Department and Clinical Epidemiology Department if any activity is questionable under these guidelines.

Yes	No	
■		Will dust be generated during this project? ***If yes, explain location of and plan for interim dust barriers or attach floor plan with barriers clearly marked.***
■		Will debris removal be necessary? ***If yes, explain plan for debris removal and control.***
		Designated routes will be used at times that will be coordinated with departments POC
■		Negative airflow ventilation and filtration in place and assessed for effectiveness.
■		Exhaust fans in place and functioning.
■		Is supply duct to area closed and HEPA filtration unit in place and functioning in adjacent patient care area?
■		Will work be done in a sterile area? ***If so, how are you going to maintain sterile atmosphere in work area and access to and from work area?*** Work area will be sealed off from other areas.
Type A		**Inspections and Non-Invasive Activities or Small scale, Short duration Activities**
Yes	No	
		Removal of ceiling tiles for VISUAL INSPECTION (limited to 1 tile per 50 square feet)
		Painting (but not sanding) and Wall covering---Describe work to be done:
		Electrical trim work. Describe:
		Minor plumbing. Describe:
		Outdoor construction that does not involve major earth movement.
Type B		**Small scale, short duration activities that create minimal dust.**
Yes	No	
		Installation of telephone and computer cabling
		Access to chase spaces
		Sanding of walls for painting or wall covering (minor repairs---not sanding for drywall finishing)
Type C		**Any work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies. *(May require approval from VA Safety and Infection Control prior to beginning project)***
Yes	No	
		Sanding of walls--drywall finishing
		Removal of ☐floor coverings ☐ceiling tiles ☐casework Describe:
		Cutting of walls or ceiling. Describe:
		New wall construction
		Minor ductwork or electrical work above ceilings
		Major cabling activities
		Activity cannot be completed within a single work shift
		Has approval been obtained from State Fire Marshal and Health Department?
Type D		**Major demolition and construction projects. *(Authority Having Jurisdiction)***
Yes	No	
■		Will require heavy demolition or removal of a complete ceiling system
■		New construction
■		Has approval been obtained from VA Safety and Infection Control?

GROUP I LOWEST	GROUP 2 MEDIUM	GROUP 3 MEDIUM HIGH ■	GROUP 4 HIGHEST
1.) Any building where patient care is NOT performed and does not have occupied offices. 2.) Outdoor areas with no regular foot traffic.	•Admitting •Outpatient Clinics/Office •Outpatient waitingareas •Cafeteria •Laboratory •Physical Therapy •Occupied office space	•In-patient/Residential units •Emergency room •Radiology/Nuc.Med./MRI •Echocardiography •Dialysis •Pharmacy •Central Supply/WDU •Dental •Microbiology •Women's Health/clinical rooms	•OR Suites and Corridors •Sterile Core and connecting rooms •Day Surgery, Cystoscopy/GU/GI •Pre/Post Op Holding (PACU/ASU) •Cardiac Cath Lab •Intensive Care Units •Pharmacy admixture •Oncology •Interventional Radiology/INR •Sterile Processing/Supply/Storage •Pain Clinic Intervention Rooms

Contact the Clinical Epidemiology Department for risk assessment of any area not listed above.

CONSTRUCTION ACTIVITY (from previous page) *Check type of activity*		INFECTION CONTROL RISK GROUP (see above) *Check risk group*	
▭	TYPE A: Inspection, non-invasive activity	▭	GROUP 1: Lowest Risk
▭	TYPE B: Small scale, short duration projects	▭	GROUP 2: Medium Risk
■	TYPE C: Activity generates moderate to high levels of dust, requiring >1 work shift for completion	■	GROUP 3: High Risk
▭	TYPE D: Major duration and construction activities Requiring consecutive work shifts	▭	GROUP 4: Highest Risk

CLASSIFICATION OF REQUIRED PREVENTIVE MEASURES

CONSTRUCTION ACTIVITY → / INFECTION CONTROL RISK GROUP ↓	TYPE "A"	TYPE "B"	TYPE "C"	TYPE "D"
LOW (Risk Group I)	I	II	II	III/IV
MEDIUM (Risk Group 2)	I	II	III/IV	IV
MEDIUM HIGH (Risk Group 3)	I	III	III/IV	IV
HIGHEST (Risk Group 4)	III	IV	IV	IV ■

An Infection Control—Safety Construction Permit is required for Class II or higher projects. Refer to shaded area on Construction Activity/Risk Group Matrix (above).

CLASS I ▭	1. Execute work by methods to minimize raising dust from construction operations.	2. Immediately replace any ceiling tile displaced for visual inspection.
CLASS II ▭	1. Provide active means to prevent air-borne dust from dispersing into atmosphere 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Wipe surfaces with disinfectant.	6. Contain construction waste before and during transport in tightly covered containers. 7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 8. Place dust mat at entrance and exit of work area as needed. 9. Remove or isolate HVAC system in areas where work is being performed.
CLASS III ■	1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 3. Complete all critical barriers before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Contain construction waste before and during transport in tightly covered containers. 6. Seal holes, pipes, conduits, etc. appropriately.	7. Place dust mat at entrance and exit of work area. Replace as needed. 8. Do not remove barriers from work area until completed project is inspected by Safety and Infection Control Depts. and thoroughly cleaned. *After work is completed:* 9. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 10. Remove isolation of HVAC system.
Class IV ▭	1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Seal holes, pipes, conduits, and punctures appropriately. 6. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.	7. All personnel entering work site are required to wear shoe covers 8. Contain construction waste before and during transport in tightly covered containers. Cover transport receptacles or carts. Tape covering. 9. Do not remove barriers from work area until completed project is inspected by Safety and Infection Control Depts. and thoroughly cleaned. *After work is completed:* 10. Vacuum work area with HEPA filtered vacuums. 11. Wet mop with disinfectant. 12. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 13. Remove isolation of HVAC system.

Additional concerns for all classes:
1. Maintain manpower and equipment including dust mops, wet mops, brooms, buckets, and clean wiping rags for cleaning fine dust from floors and adjacent occupied areas.
2. Contain work areas outside of construction barriers, including spaces above ceilings, with full height polyethylene sheet barrier, tightly taped.
3. Clean up dust tracked outside of construction area immediately.
4. Temporary construction barriers and closures above ceiling must be dust tight.
5. Removal of debris must be in covered containers.

Additional Requirements or Concerns:

REVIEW ALL ICRA MEASURES WITH COR PRIOR TO PROCEEDING WITH CONSTRUCTION

Project COR:	Projects Section Supervisor:	Safety Section Approval:
Date:	Date:	Date:
Infection Control Representative Approval:	**Chief, Engineering Service Approval:**	**VA Police Representative Approval:**
Date:	Date:	Date:
M&O Supervisor (As Required) Approval:	**Patient Safety (As Required) Approval:**	**Additional (POC) Approval:**
Date:	Date:	Date:

BUILDING 41

PASSENGER ELEVATORS P-1, P-2, P-3, AND P-4 ARE GROUP 3, CONSTRUCTION TYPE C, AND CLASS III

SERVICE ELEVATORS S-1, S-2, S-3, AND S-4 ARE GROUP 3, CONSTRUCTION TYPE C, AND CLASS III

DUMBWAITER T-4 IS GROUP 4, CONSTRUCTION TYPE C, AND CLASS IV

SHEET NOTES:

DUST CONTROL PLAN NOTES

A. THIS PROJECT INCLUDES CONSTRUCTION ANTEROOM - CONSTRUCTION ANTEROOM AT LOCATIONS WHERE THE ELEVATOR SHAFT DOORS ARE TO REMAIN OPEN FOR LONGER THAN ONE CONSTRUCTION SHIFT. THEY SHALL BE USED WHEN GOING INTO CONSTRUCTION AREA AND LEAVING THE CONSTRUCTION AREA AND TIGHT SEALS SHALL BE MAINTAINED AT THE FULL PERIMETER OF WALLS AND WALL PENETRATIONS. ANY DUST SHALL BE IMMEDIATELY CLEANED IF TRACKED OUTSIDE OF THE CONSTRUCTION BARRIER. UPON COMPLETION OF THE CONSTRUCTION PHASE, DUST BARRIERS SHALL BE REMOVED CAREFULLY AFTER VA COR'S APPROVAL TO MINIMIZE SPREADING OF DUST AND THE CONTRACTOR SHALL HAVE TEMPORARY DUST PROTECTION IN PLACE BEFORE REMOVAL OF A PERMANENT BARRIER.

INTERNAL DEMOLITION AND CONSTRUCTION ACTIVITIES DUST AND DEBRIS CONTROL

B. TRAFFIC CONTROL: DESIGNATED ENTRY AND EXIT PROCEDURES SHALL BE DEFINED. EGRESS PATHS SHALL BE FREE OF DEBRIS; DESIGNATED ELEVATORS SHALL BE USED DURING SCHEDULED TIMES; AND ONLY AUTHORIZED PERSONNEL SHALL BE ALLOWED TO ENTER THE CONSTRUCTION ZONE. SIGNAGE SHALL DIRECT PEDESTRIAN TRAFFIC AWAY FROM THE CONSTRUCTION AREA AND MATERIALS.

C. DEMOLITION DEBRIS: DEBRIS SHALL BE REMOVED IN CARTS WITH TIGHTLY FITTED COVERS. EFFORTS SHALL BE MADE TO MINIMIZE USE OF ELEVATORS WITH AN EMPHASIS ON TRANSPORT DURING THE LOWEST PERIOD OF ACTIVITY. DEBRIS SHALL BE REMOVED DAILY AND AT TIMES SPECIFIED BY THE C.O.R. THE CONTRACTOR SHALL NOT HAUL DEBRIS THROUGH PATIENT-CARE AREAS WITHOUT PRIOR APPROVAL OF THE C.O.R.

VENTILATION AND ENVIRONMENTAL CONTROLS

D. NEGATIVE AIR PRESSURE: THE AIR WITHIN THE CONSTRUCTION AREA SHALL BE NEGATIVE WITH RESPECT TO SURROUNDING AREAS AND WITH NO DISRUPTION OF AIR SYSTEMS OF ADJACENT AREAS. USE OF THE NEGATIVE AIR PRESSURE SYSTEM WITHIN THE ENCLOSURE TO REMOVE DUST SHALL PASS AIR THROUGH AN INDUSTRIAL GRADE PORTABLE HEPA FILTER CAPABLE OF FILTRATION RATES OF 300-800 CUBIC FEET PER MINUTE (9FT3/MIN), 99.97% EFFICIENT CAPTURING 0.3 MICRON MPPS PARTICLES OR EXHAUST AIR DIRECTLY TO THE OUTSIDE IF APPROVED BY COR. IF EXHAUST SHALL BE TIED INTO A RE-CIRCULATED AIR SYSTEM, PRE-FILTER AND HEPA FILTER SHALL BE USED BEFORE EXHAUST TO PREVENT CONTAMINATION OF THE DUCTS.

E. ADJACENT AREAS: THE STATUS OF SEALED PENETRATIONS AND INTACT CEILING SHALL BE VERIFIED DAILY.

F. AIR EXCHANGE RATES AND PRESSURE RELATIONSHIPS: VAMC AND CONTRACTOR SHALL VERIFY AND MAINTAIN PROPER RATES IN CRITICAL AREAS NEAR CONSTRUCTION ACTIVITY AND ENSURE AIR IS NOT BEING RE-CIRCULATED WITHOUT FILTRATION FROM THE CONSTRUCTION AREA. ELSEWHERE. PROVIDE AIR PRESSURE TESTING THROUGHOUT THE PROJECT IN THE FREQUENCY AS IDENTIFIED BY THE COR.

CONTAMINATION OF PATIENT ROOMS, SUPPLIES, EQUIPMENT AND RELATED AREAS

G. WORKSITE CLOTHING: CONTRACTOR PERSONNEL CLOTHING SHALL BE FREE OF LOOSE SOIL AND DEBRIS BEFORE LEAVING THE CONSTRUCTION AREA. IF PROTECTIVE APPAREL IS NOT WORN (E.G., COVERALLS, FOOTGEAR AND HEADGEAR) A HEPA-FILTERED VACUUM SHALL BE USED TO REMOVE DUST FROM CLOTHING BEFORE LEAVING THE BARRICADE. ALL EQUIPMENT, TOOLS, TOOL CARTS, AND MATERIALS TRANSPORTED THROUGH OCCUPIED AREAS SHALL BE MADE FREE FROM DUST AND MOISTURE BY VACUUMING AND WET WIPING BEFORE THEIR REMOVAL FROM THE CONSTRUCTION ZONE OR WORK AREA.

H. POST CONSTRUCTION: DO NOT REMOVE BARRIERS AND KEEP ALL HVAC ISOLATION UNTIL CONTRACTOR HAS CLEANED CONSTRUCTION SITE, VA EMS STAFF HAS DONE A TERMINAL CLEANING, AND VA INFECTIOUS DISEASE CONTROL HAS INSPECTED AND APPROVED THE CLEANING.

GENERAL

I. PROVIDE RATED BARRIERS AS INDICATED ON DRAWINGS. BARRIERS SHALL BE INSPECTED BY VA PRCA STAFF PRIOR TO START OF CONSTRUCTION. MAINTAIN NEGATIVE PRESSURE VENTILATION IN THE CONSTRUCTION SPACE.

J. USE MOBILE CONTAINMENT CART FOR ALL WORK ABOVE CEILINGS.

K. PROVIDE STICKY MAT AT EACH CONSTRUCTION POINT IN ALL PHASES.

L. VA REQUIRES THAT ALL APPLICABLE PERMITS BE COMPLETED AND APPROVED PRIOR TO BEGINNING ANY WORK ON STATION.
PERMITS INCLUDE:
ICRA, PCRA, ILSM, ABOVE CEILING, FIRE/SMOKE WALL, UTILITY, FIRE SPRINKLER, FIRE ALARM SYSTEM, MEDICAL GASES, CONFINED SPACE, HOT WORK, AND BUILDING CODE.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO — WALTER DAVID VANSCOTER — ARC.1716954 — REGISTERED ARCHITECT — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PRE CONSTRUCTION RISK ASSESSMENT (PCRA)

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Drawing Number: G-003

Dwg 3 of 12

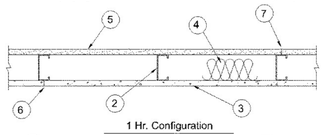
DocuSign Envelope ID: 07C43203-E5B9-473E-9D20-707CF31E3BE9

Design No. U404

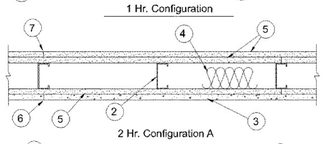
September 27, 2019

Nonbearing Wall Rating — 1 and 2 Hr (See Items 3 and 5)

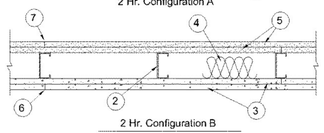
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



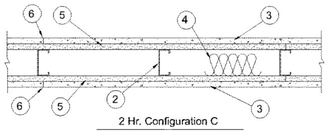
1 Hr. Configuration



2 Hr. Configuration A



2 Hr. Configuration B



2 Hr. Configuration C

1. **Steel Floor and Ceiling Runners —** (Not Shown) — Channel shaped, 3-1/2 in. wide by 1-1/4 in. deep, fabricated from min 20 MSG (0.0329 in., min bare metal thickness) galvanized steel. Attached to floor and ceiling with steel fasteners spaced 24 in. OC max.

2. **Steel Studs —** Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min width, min 1-1/2 in. flanges and 1/4 in. return, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.

3. **Cementitious Backer Units* —** 1/2 in. or 5/8 in. thick, applied vertically or horizontally with vertical joints centered over studs. Fastened to studs and runners with corrosion resistant, chamfered, ribbed wafer head screws with a minimum head diameter of .400 inch. For nonbearing systems, fastened to studs and bottom runners with the uppermost screws placed 1/2 in. to 2 in. below the bottom edge of the leg of the top runner. Horizontal joints need not be backed by framing. **1 Hr System** - Screws shall be min 1-1/4 in. long and spaced a max of 8 in. OC. All vertical joints staggered one stud cavity from gypsum board vertical joints on the opposite side of studs. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. **2-Hr System** - For the base layer in Configuration B, the screws shall be min 1-1/4 in. long and spaced a max of 12 in. OC. For the face layers, screws shall be 1-5/8 in. long and spaced a max of 8 in. OC. All face layer joints offset min 12 in. from underlying base layer joints. Joints in either layer need not be staggered from joints on the opposite side of the wall.
UNITED STATES GYPSUM CO — Type DCB

4. **Batts and Blankets* —** Min 3 in. thick mineral wool insulation batts, friction-fitted between studs .
INDUSTRIAL INSULATION GROUP L L C — Type SAFB

JOHNS MANVILLE — Type SAFB

ROCKWOOL — Type AFB, min. density 1.8 pcf / 28.8 kg/m^3

THERMAFIBER INC — Type SAFB, SAFB FF

5. **Gypsum Board* —** 5/8 in. thick, with square or tapered edges, applied vertically or horizontally with vertical joints centered over studs. Horizontal joints need not be backed by framing. Fastened with Type S-12 screws. **1-Hr System** - For vertical application, fastened to studs and runners with 1 in. long screws spaced max 8 in. OC at vertical edges and spaced max 12 in. OC in the field. For horizontal application, fastened to studs and runners with 1 in. long screws spaced max 8 in. OC. Vertical joints staggered one stud cavity from cement board vertical joints on opposite side of studs. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. **2-Hr System** - Base layer with an overlying gypsum board face layer, fastened with 1 in. long screws spaced max 16 in. OC to studs and runners. Base layer with an overlying cement board face layer, fastened with 1 in. long screws spaced max 12 in. OC to studs and runners. Face layers fastened with 1-5/8 in. long screws spaced max 16 in. OC to studs and runners with screws offset 8 in. from face layer screws. Face layer joints offset min 12 in. from base layer joints. Joints in either layer need not be staggered from joints on the opposite side of the wall. When used in widths other than 48 in., gypsum panels to be installed horizontally.
CGC INC — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, SGX, ULX, USGX, WRC or WRX (Joint tape and compound, Items 6 and 7, optional for use with Type USGX).

UNITED STATES GYPSUM CO — Type AR, C, FRX-G, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULIX, ULX, WRC, WRX, USGX (Joint tape and compound, Items 6 and 7, optional for use with Type USGX).

USG BORAL DRYWALL SFZ LLC — Types C, SCX, SGX, USGX (Joint tape and compound, Items 6 and 7, optional for use with Type USGX).

USG MEXICO S A DE C V — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULX, USGX, WRC, WRX (Joint tape and compound, Items 6 and 7, optional for use with Type USGX).

5A. **Gypsum Board* —** (As an alternate to Item 5 may be used as the base layer on one or both sides of wall, For direct attachment only) - Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or #6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.
RAY-BAR ENGINEERING CORP — Type RB-LBG

5B. **Gypsum Board* —** (As an alternate to Item 5 may be used as the base layer on one or both sides of wall, For direct attachment only). Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or #6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 *in.* OC in the field.
NEW ENGLAND LEAD BURNING CO INC, DBA NELCO — Nelco

5C. **Gypsum Board* —** (As an alternate to Item 5) For Direct Application to Studs Only- For use as the base layer or as the face layer. Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-5/8 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in OC in the field when applied as the base layer. When applied as the face layer screw length to be increased to 2-1/2 in. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 10 ft long with a max thickness of 0.140 in. placed on the face of studs and attached to the stud with two 1 in. long Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead disc, max 5/16 in. diam by max 0.140 in. thick, compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Fasteners for face layer gypsum panels (Item 5) when installed over lead backed board to be min 2-1/2 in.
MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

5D. **Gypsum Board* —** (As an alternate to Items 5 may be used as the base layer on one or both sides of wall, For direct attachment only) For Direct Application to Studs Only- Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead disc, max 5/16 in. diam by max 0.140 in. thick, compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Fasteners for face layer gypsum panels (Item 5) when installed over lead backed board to be min 2-1/2 in.
MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Fasteners for face layer gypsum panels (Item 5) when installed over lead backed board to be min 2-1/2 in. Type S-12 bugle head steel.
RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

6. **Joints —** Covered with glass fiber mesh tape and latex modified Portland cement mortar or basecoat, or Type I organic adhesive.

7. **Joints —** When tapered edge gypsum board is used, face layer joints covered with joint compound and paper tape. As an alternate, gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard with joints reinforced. When square-edge gypsum board is used, treatment of joints is optional.

8. **Vapor Retarder, Water Barrier or Weather Resistive Barrier —** (Optional — Not shown) — As required.

9. **Lead Batten Strips —** (Not Shown, For use With Item 5A) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5A) and optional at remaining stud locations. Required behind vertical joints.

9A. **Lead Batten Strips —** (Not Shown, for use with Item 5C) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5) and optional at remaining stud locations.

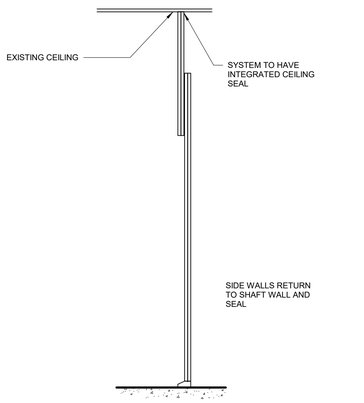
10. **Lead Discs or Tabs —** (Not Shown, For use With Item 5A) - Used in lieu of or in addition to the lead batten strips (Item 9) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 5A) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

10A. **Lead Discs —** (Not Shown, for use with Item 5C) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

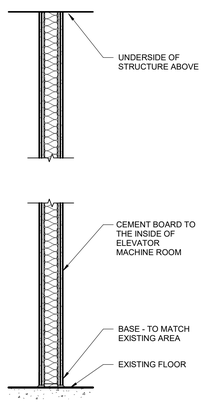
11. **Lead Batten Strips —** (Not Shown, For Use With Item 5B) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5B) and optional at remaining stud locations.

12. **Lead Tabs —** (Not Shown, For Use With Item 5B) 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 5B) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



A TEMPORARY PREFABRICATED ICRA WALL SYSTEM BASIS OF DESIGN: STARC WALL SYSTEM OR EDGEGUARD SYSTEM OR EQUAL.



B 2-HR PARTITION U.L. DESIGN NO. U404

6 ICRA BARRIER WALL TYPES

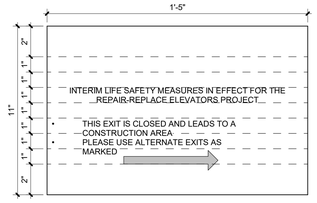
Scale: 3/4" = 1'-0"

ILSM TEMPORARY BARRIER TAG

ILSM TEMPORARY BARRIER TAG	
PROJECT:	
PRIME CONTRACTOR:	
SUB CONTRACTOR:	
EMERGENCY CONTACT NO.:	
BARRIER INSTALLATION DATE:	
BARRIER EXPIRATION DATE:	

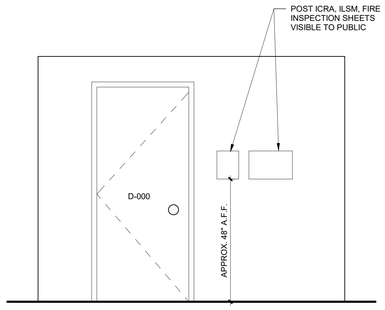
ICRA, ILSM, FIRE WATCH AND MISC. FORMS

PAPER CADDY



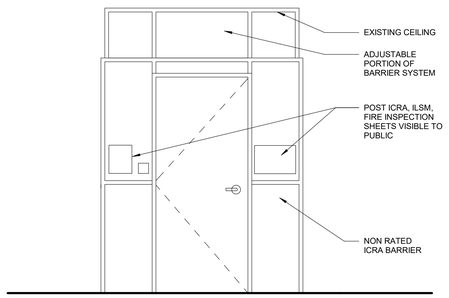
3 ILSM SIGNAGE

Scale: 3" = 1'-0"



4 TYPICAL RATED ENCLOSURE - FRONT ELEVATION

Scale: 1/2" = 1'-0"



5 ENCLOSURE ENTRY ELEVATION

Scale: 1/2" = 1'-0"

DOOR AND FRAME SCHEDULE

DOOR INFORMATION							FRAME INFORMATION			MISCELLANEOUS		
NO.	QTY.	WIDTH	HEIGHT	THICK.	TYPE	MAT'L	TYPE	MAT'L	DEPTH	RATING	HRDWR.	REMARKS
D-000	3	3'-0"	7'-0"	1 3/4"	TYPE A	HM	TYPE 1	HM	6 3/4"	90 MIN.	2	
D-001	(2)	2'-0"	7'-0"	1 3/4"	TYPE A	HM	TYPE 1	HM	6 3/4"	90 MIN.	1	DOUBLE DOOR

NOTE: THIS DOOR AND FRAME SCHEDULE IS FOR RATED TEMPORARY ENCLOSURES ONLY

HARDWARE SET 1

6	HINGES	TA2714	630	MK
1	FLUSH BOLTS	2845	32D	RO
2	DUST PROOF STRIKE	570	32D	RO
1	PASSAGE SET	ML2010	26D	CO
1	COORDINATOR	2600 SERIES	32D	RO
1	ASTRAGAL	BY DOOR MANUF.		
2	DOOR CLOSER	DC6210xA11	689	CO
4	KICK PLATES	K1050F	32D	RO
2	GASKETING	S88C x HEAD & JAMBS		PE

HARDWARE SET 2

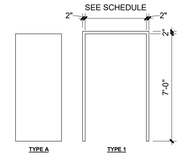
3	HINGES	TA2714	630	MK
1	DUST PROOF STRIKE	570	32D	RO
1	LATCH SET	VA SPEC F01	26D	
1	DOOR CLOSER	DC6210xA11	689	CO
2	KICK PLATES	K1050F	32D	RO
1	GASKETING	S88C x HEAD & JAMBS		PE

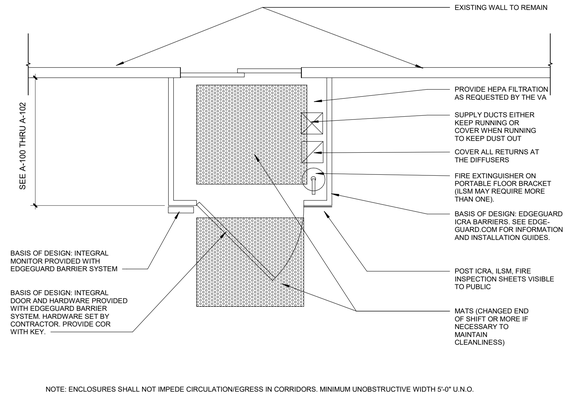
MANUFACTURERS:

CORBIN RUSSWIN	CO
McKINNEY	MK
PEMKO	PE
ROCKWOOD	RO

NOTE:

HARDWARE MANUFACTURER'S LISTED AS BASIS OF DESIGN. ALTERNATE MANUFACTURERS ACCEPTABLE, SUBJECT TO REVIEW BY ARCHITECT AND C.O.R. FOR EQUAL QUALITY COMPLIANCE



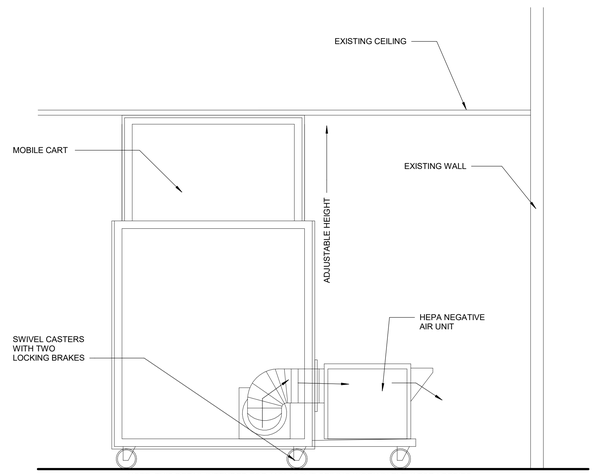


NOTE: ENCLOSURES SHALL NOT IMPEDE CIRCULATION/EGRESS IN CORRIDORS. MINIMUM UNOBSTRUCTIVE WIDTH 5'-0" U.N.O.

1 TYPICAL NON RATED ICRA BARRIER

Scale: 1/2" = 1'-0"

SEE ENLARGED ARCHITECTURAL PLANS FOR LOCATIONS



NOTE: THIS DETAIL INTENDED FOR ANY ABOVE CEILING WORK IN ELEVATOR LOBBIES.

2 MOBILE CONTAINMENT CART

Scale: 1/2" = 1'-0"

GENERAL NOTES:

A. CONTRACTOR SHALL VISIT ALL AREAS OF WORK, INCLUDING WALKING THE SITE; MEASURING EXISTING DIMENSIONS AND OBSERVING EXISTING CONDITIONS BEFORE BEGINNING WORK, ORDERING MATERIALS, OR STARTING ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS OF EXISTING SITE CONDITION PRIOR TO START OF WORK AND ORDERING OF MATERIALS.

B. CONTRACTOR SHALL RECYCLE REMOVED MATERIALS WHENEVER POSSIBLE. SEE DIVISION 1 SPECIFICATIONS

C. CONTRACTOR TO PROTECT AREA ADJACENT TO THE DEMOLITION AND NEW CONSTRUCTION WORK TO PREVENT DAMAGES. (IF DAMAGED, REPAIR, PATCH, REPLACE, OR SAND SMOOTH AND TO MATCH EXISTING ADJACENT MATERIALS.)

D. CONTRACTOR SHALL REPORT TO COR IMMEDIATELY WHEN DISCREPANCIES TO THE DRAWINGS ARE FOUND IN THE FIELD.

E. CONTRACTOR TO INSTALL TEMPORARY DIGITAL MANOMETER TO MONITOR AND ENSURE PRESSURE LEVEL TO MEET VA GUIDELINE WITHIN CONSTRUCTION AREA. (CONTRACTOR TO VERIFY LOCATIONS) WITH VA COR PRIOR TO INSTALLATION.

INFECTION CONTROL RISK ASSESSMENT NOTES:

* OBTAIN INFECTION CONTROL PERMIT BEFORE CONSTRUCTION BEGINS.

COMPLETE ALL CRITICAL BARRIERS OR IMPLEMENT CONTROL CUBE METHOD BEFORE CONSTRUCTION BEGINS.

SEAL HOLES, PIPES, CONDUITS, AND PUNCTURES APPROPRIATELY.

DO NOT REMOVE BARRIERS FROM WORK AREA UNTIL COMPLETED PROJECT IS INSPECTED BY THE OWNER'S SAFETY/ IP AND FACILITIES MANAGEMENT DEPARTMENT AND AFTER PROFESSIONAL CLEAN BY GC.

COVER TRANSPORT RECEPTACLES OR CARTS. TAPE COVERING UNLESS SOLID LID.

VACUUM WORK AREA WITH HEPA FILTERED VACUUMS. WET MOP AREA WITH DISINFECTANT.

COVER ALL RETURNS AND SUPPLY DUCTS AT THE GRATE/DIFFUSES WITH FILTER MEDIA OR BLANK OFF ENTIRELY. RESTORE NORMAL HVAC OPERATION IN IMPACTED AREA AFTER ENCLOSURE IS REMOVED.

KEEP CONSTRUCTION SITE CLEAN & NEAT AT ALL TIMES.

CONTRACTOR TO CLEAN THE CONSTRUCTION AREA, AND PREPARE FOR SAFETY AND INFECTION CONTROL'S INSPECTION AND FINAL CLEANING BY VA ECM STAFF.

VA INFECTION CONTROL STAFF WILL PERFORM FINAL VERIFICATION OF CLEANING AND SANITATION.

INTERIM LIFE SAFETY MEASURES NOTES (ISLM):

IF APPLICABLE:

HOT WORK PERMITS
PERMITS MUST BE OBTAINED 24 HOURS PRIOR TO COMMENCEMENT OF WORK, WHENEVER POSSIBLE. ORIGINAL PERMIT TO BE POSTED WHERE WORK IS BEING PERFORMED; CONTRACTOR MUST RETURN PERMIT TO SAFETY OFFICE WHEN WORK IS COMPLETED.

FIRE WATCH. CONTRACTOR MUST INITIAL, DATE AND TIME EVERY 30 MINUTES AFTER HOT WORK HAS STARTED.

CONTRACTOR TO PROVIDE WARNING SIGNAGE AND DIRECTIONAL SIGNAGE THAT SHALL BE POSTED IN CONSTRUCTION AREA WHILE WORK IS PERFORMED.

CONFINED SPACE. CONTRACTOR TO OBTAIN CONFINED SPACE PERMIT PRIOR TO ENTRY INTO MECHANICAL CHASE. ENSURE IT IS APPROVED BY VA SAFETY DEPARTMENT AND COR.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO — WALTER DAVID VANSCOTER — ARC.1716954 — REGISTERED ARCHITECT — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511

www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: INFECTION CONTROL RISK ASSESSMENT (ICRA)

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number G-004

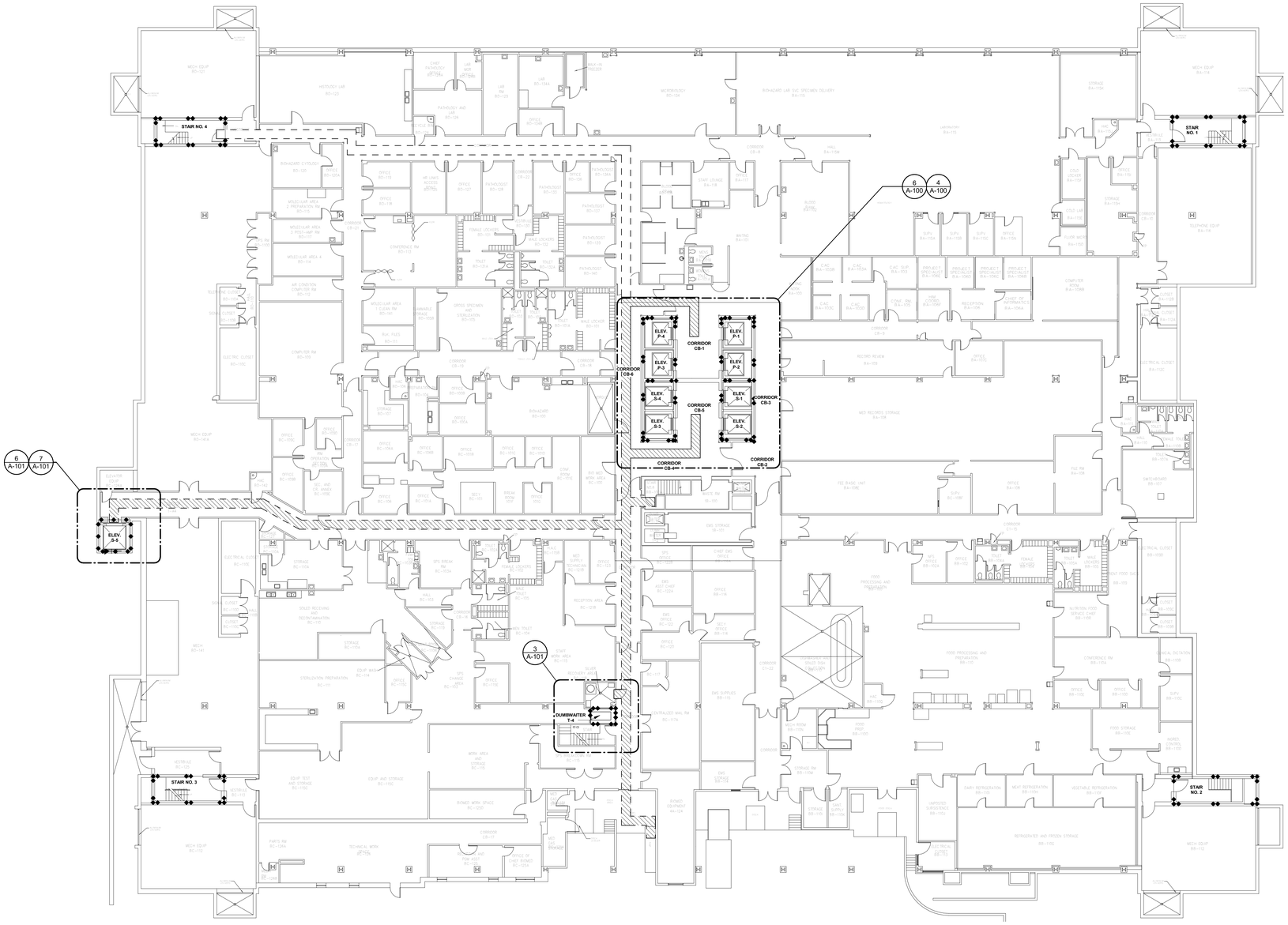
Dwg 4 of 12

1/24/2023 9:22:53 AM

VA FORM 08-6231

DocuSign Envelope ID: 07C43203-E5B9-473E-9D20-707CF31E3BE9

BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
BASEMENT			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III
S-5	Type C	Group 3	Class III
T-4	Type C	Group 4	Class IV



1 **BLDG 41 OVERALL BASEMENT PLAN**
Scale: 1/16" = 1'-0"

0 8 16 32 NORTH

BUILDING 41 PHASING

MODERNIZATION OF T-4 TO OCCUR FIRST IN BUILDING 41

SCOPE OF WORK INCLUDES ELEVATORS LOCATED IN TWO BUILDINGS CONTRACTOR MAY PHASE AS DESIRED SO LONG AS THE FOLLOWING CONDITIONS ARE MET:

3 PASSENGER ELEVATORS IN THE BANK OF 4 PASSENGER ELEVATORS ARE TO REMAIN OPERATIONAL THROUGHOUT ENTIRE CONSTRUCTION PERIOD.

3 SERVICE ELEVATORS IN THE BANK OF 4 SERVICE ELEVATORS ARE TO REMAIN OPERATIONAL THROUGHOUT ENTIRE CONSTRUCTION PERIOD.

CONTRACTOR TO PROVIDE PHASING PLAN AND GANTT CHART SCHEDULE WITHIN 14 DAYS OF NOTIFICATION OF AWARD. PHASING PLAN TO IDENTIFY ALL ELEVATORS IN SCOPE OF WORK AND THE PROPOSED ORDER OF MODERNIZATION.

SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

C. STICKY MATS AT ALL CONSTRUCTION ACCESS POINTS. STICKYMATS TO BE CHANGED WHEN DIRTY AND AT VA REQUEST.

D. WHERE HOISTWAY DOORS ARE NOT REMAINING OPEN FOR AN EXTENDED PERIOD OF TIME, NO LONGER THAN (1) 8 HOUR SHIFT. PROVIDE NON-RATED ICRA ENCLSURE. BASIS OF DESIGN, STARC OR EDGEGUARD SYSTEMS OR EQUAL. SUBMITTAL REQUIRED.

E. HOISTWAY DOORS MUST BE BARRICADED AT EACH LANDING WHEN HOISTWAY DOORS ARE OPEN.

REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

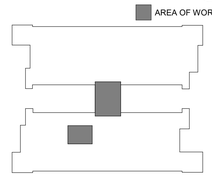
CONSTRUCTION EGRESS ROUTE

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK



WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER VAN SCOY VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL BASEMENT FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

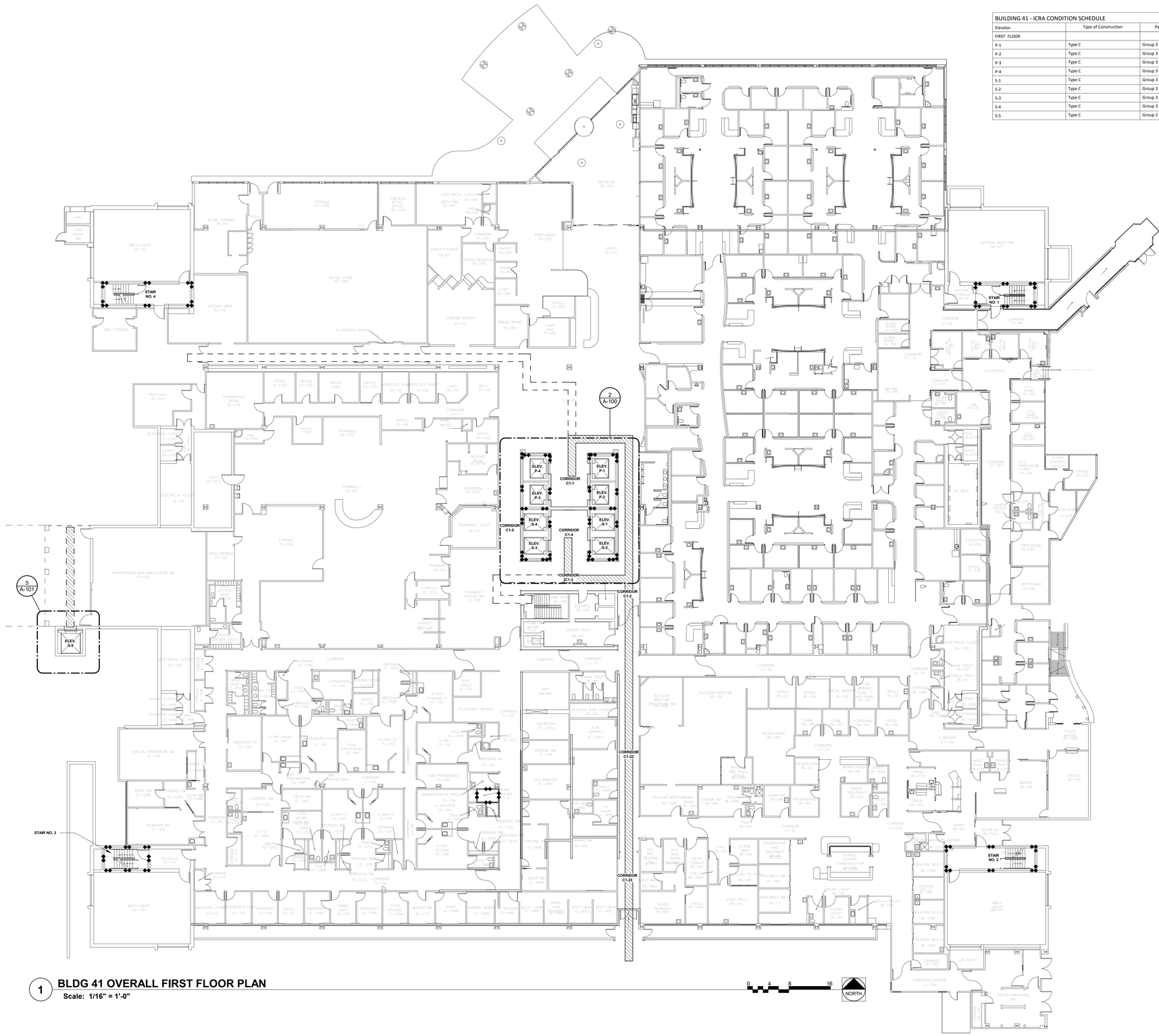
Building Number # 41

Drawing Number G-100

Dwg 5 of 12

DocuSign Envelope ID: 07C43203-E5B9-473E-9D20-707CF31E3BE9

BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
FIRST FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III
S-5	Type C	Group 2	Class III



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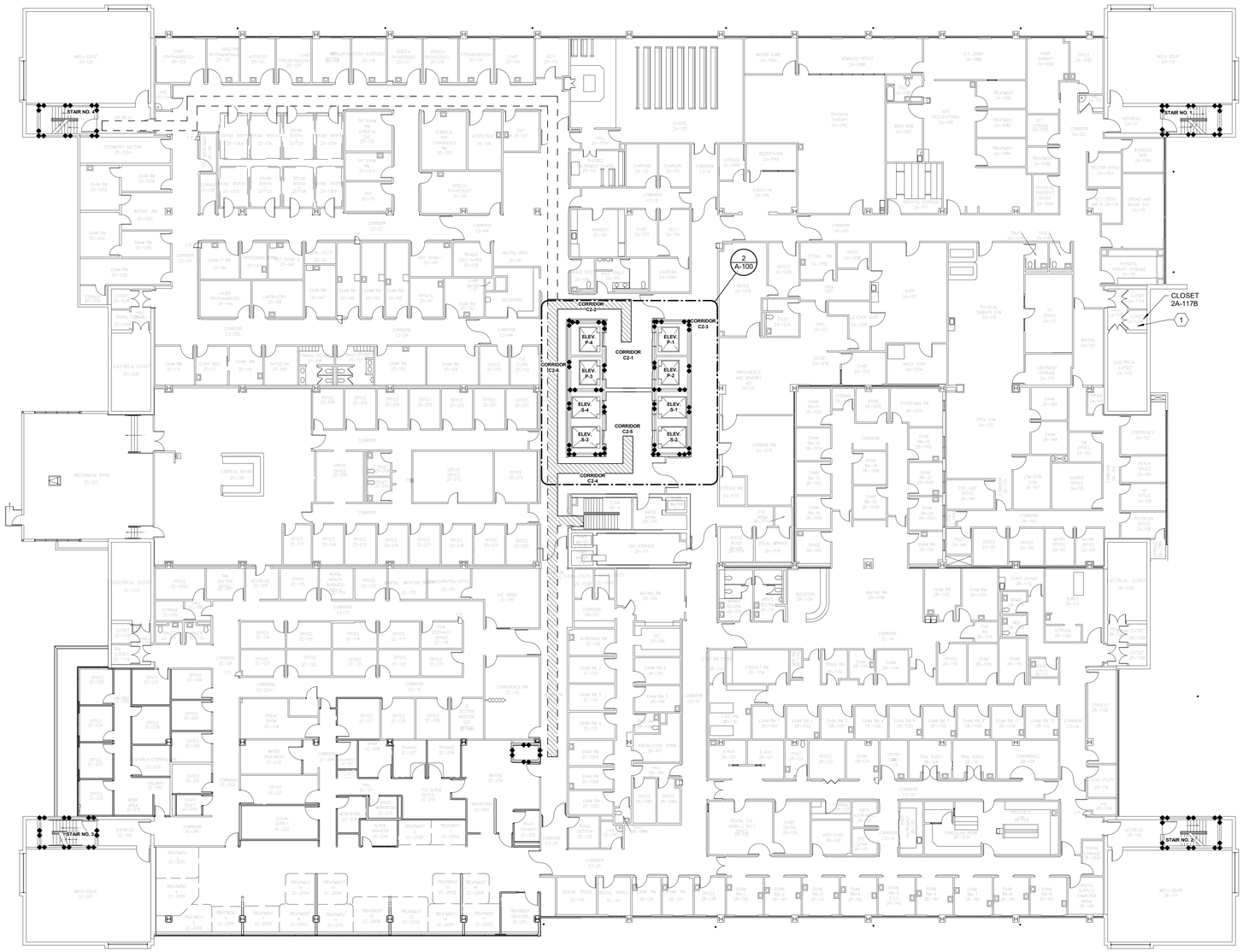
BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
SECOND FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III



1 **BLDG 41 OVERALL SECOND FLOOR PLAN**
Scale: 1/16" = 1'-0"

0 8 16 32 NORTH

SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

C. STICKY MATS AT ALL CONSTRUCTION ACCESS POINTS. STICKYMATS TO BE CHANGED WHEN DIRTY AND AT VA REQUEST.

D. WHERE HOISTWAY DOORS ARE NOT REMAINING OPEN FOR AN EXTENDED PERIOD OF TIME, NO LONGER THAN (1) 8 HOUR SHIFT. PROVIDE NON-RATED ICRA ENCLSURE. BASIS OF DESIGN, STARC OR EDGEGUARD SYSTEMS OR EQUAL. SUBMITTAL REQUIRED.

E. HOISTWAY DOORS MUST BE BARRICADED AT EACH LANDING WHEN HOISTWAY DOORS ARE OPEN.

REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

(##) KEY NOTES:

1. LOCATION FOR i STAR PRO 8 CARD READER CONTROLLER (EMERGENCY POWER)

LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

CONSTRUCTION EGRESS ROUTE

KEY PLAN
SCALE: NO SCALE

WALL RATING LEGEND

1 HR - FIRE SEPARATION
2 HR - FIRE SEPARATION
SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:
ACG Project Number 19-262

APOGEE Engineers | Architects
Headquarters:
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1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420
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Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL SECOND FLOOR PLAN
Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108
Project Title: REPAIR-REPLACE ELEVATORS IN B-41
Approved: Project Director
Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD
VA PROJECT NUMBER 501-19-101
Building Number # 41
Drawing Number G-102
Dwg 7 of 12

1/24/2023 9:22:57 AM

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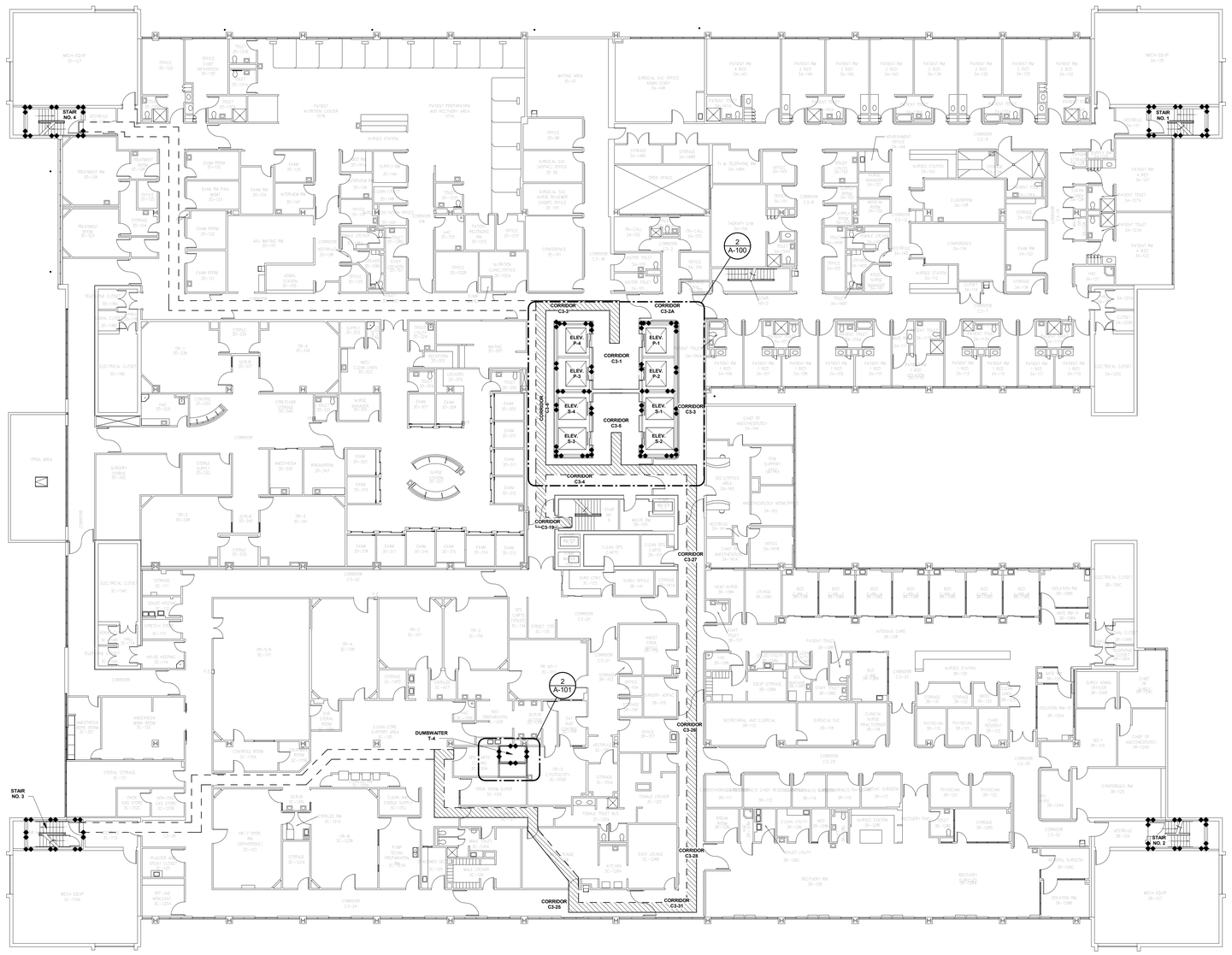
BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
THIRD FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III
T-4	Type C	Group 4	Class IV



1 BLDG 41 OVERALL THIRD FLOOR PLAN
Scale: 1/16" = 1'-0"

0 8 16 32 NORTH

SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

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REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

CONSTRUCTION EGRESS ROUTE

KEY PLAN

SCALE: NO SCALE

AREA OF WORK

WALL RATING LEGEND

1 HR - FIRE SEPARATION
2 HR - FIRE SEPARATION
SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
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1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL THIRD FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

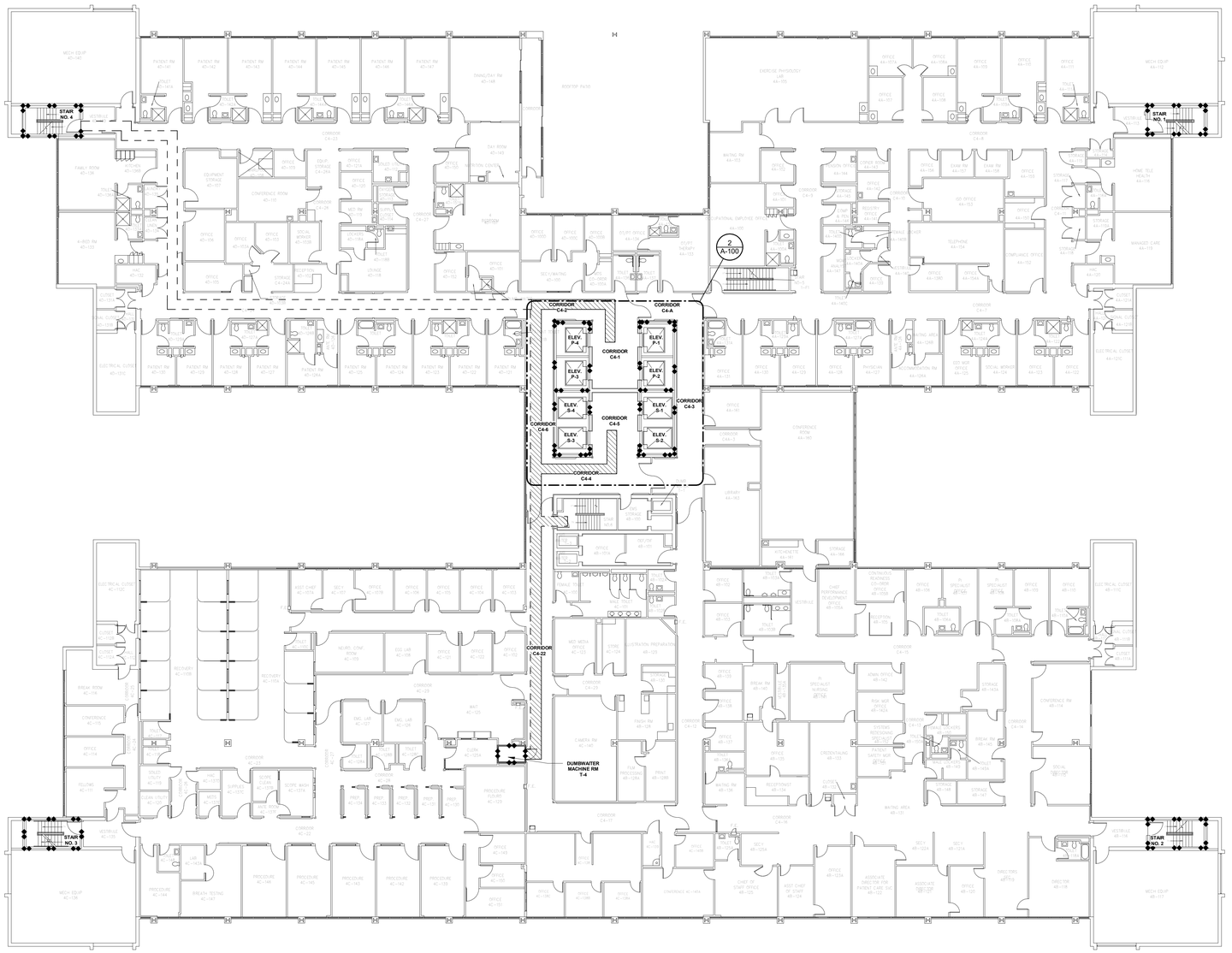
Building Number # 41

Drawing Number G-103

Dwg 8 of 12

DocuSign Envelope ID: 07C43203-E5B9-473E-9D20-707CF31E3BE9

BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
FOURTH FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III


STAIR NO. 4
STAIR NO. 1
STAIR NO. 3
STAIR NO. 2
2
A-100
CORRIDOR C4-2
CORRIDOR C4-A
CORRIDOR C4-1
CORRIDOR C4-6
CORRIDOR C4-5
CORRIDOR C4-3
CORRIDOR C4-4
CORRIDOR C4-22
ELEV. P-4
ELEV. P-1
ELEV. P-3
ELEV. P-2
ELEV. S-4
ELEV. S-1
ELEV. S-3
ELEV. S-2
DUMBWAITER MACHINE RM T-4
ROOFTOP PATIO
EXERCISE PHYSIOLOGY LAB 44-155
MECH EQUIP 44-112
MECH EQUIP 4C-100
MECH EQUIP 4C-106
MECH EQUIP 4B-111
ELECTRICAL CLOSET 4C-139
ELECTRICAL CLOSET 4B-116
ELECTRICAL CLOSET 4A-139
ELECTRICAL CLOSET 4B-136
ELECTRICAL CLOSET 4B-135
ELECTRICAL CLOSET 4A-136
CONFERENCE 4C-115
CONFERENCE RM 4B-114
CONFERENCE ROOM 4A-160
BREAK ROOM 4C-116
BREAK RM 4B-140
BREAK RM 4B-146
BREAK RM 4A-158
FELLOWS 4C-111
LIBRARY 4A-162
KITCHENETTE 44-161
PHYSICIAN 44-127
SOCIAL WORKER 44-124
SOCIAL WORK 4B-124
HOME TELE HEALTH 44-116
SHAHADY CARE 44-115
TELEPHONE 44-154
COMPLIANCE DEPT 44-152
GO. OFFICE 44-153
EXAM RM 44-156
EXAM RM 44-158
WAITING RM 44-163
WAITING RM 44-157
WAITING RM 4B-136
WAITING AREA 4B-131
RECEPTION 44-159
RECEPTION 4B-134
RECEPTION 4B-139
RECEPTION 4A-157
RECEPTION 4A-164
RECEPTION 4A-165
RECEPTION 4A-166
RECEPTION 4A-167
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RECEPTION 4A-180
RECEPTION 4A-181
RECEPTION 4A-182
RECEPTION 4A-183
RECEPTION

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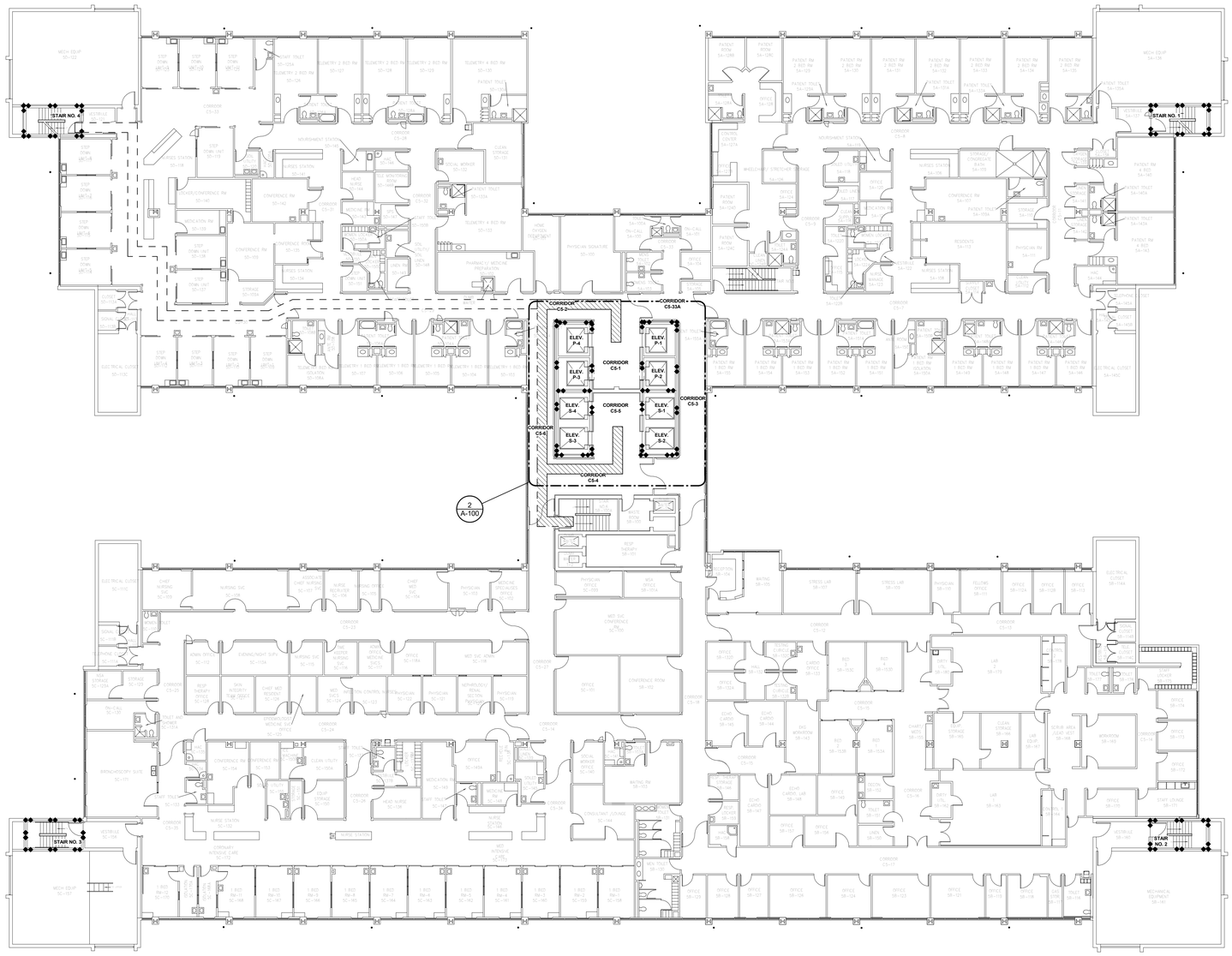
BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
FIFTH FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III



1 BLDG 41 OVERALL FIFTH FLOOR PLAN

Scale: 1/16" = 1'-0"

0 8 16 32

NORTH

SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

C. STICKY MATS AT ALL CONSTRUCTION ACCESS POINTS. STICKYMATS TO BE CHANGED WHEN DIRTY AND AT VA REQUEST.

D. WHERE HOISTWAY DOORS ARE NOT REMAINING OPEN FOR AN EXTENDED PERIOD OF TIME, NO LONGER THAN (1) 8 HOUR SHIFT. PROVIDE NON-RATED ICRA ENCLSURE. BASIS OF DESIGN, STARC OR EDGEGUARD SYSTEMS OR EQUAL. SUBMITTAL REQUIRED.

E. HOISTWAY DOORS MUST BE BARRICADED AT EACH LANDING WHEN HOISTWAY DOORS ARE OPEN.

REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

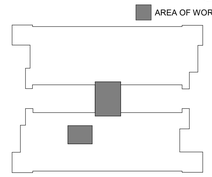
CONSTRUCTION EGRESS ROUTE

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK



WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

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Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL FIFTH FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER 501-19-101

Building Number # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

Drawing Number G-105

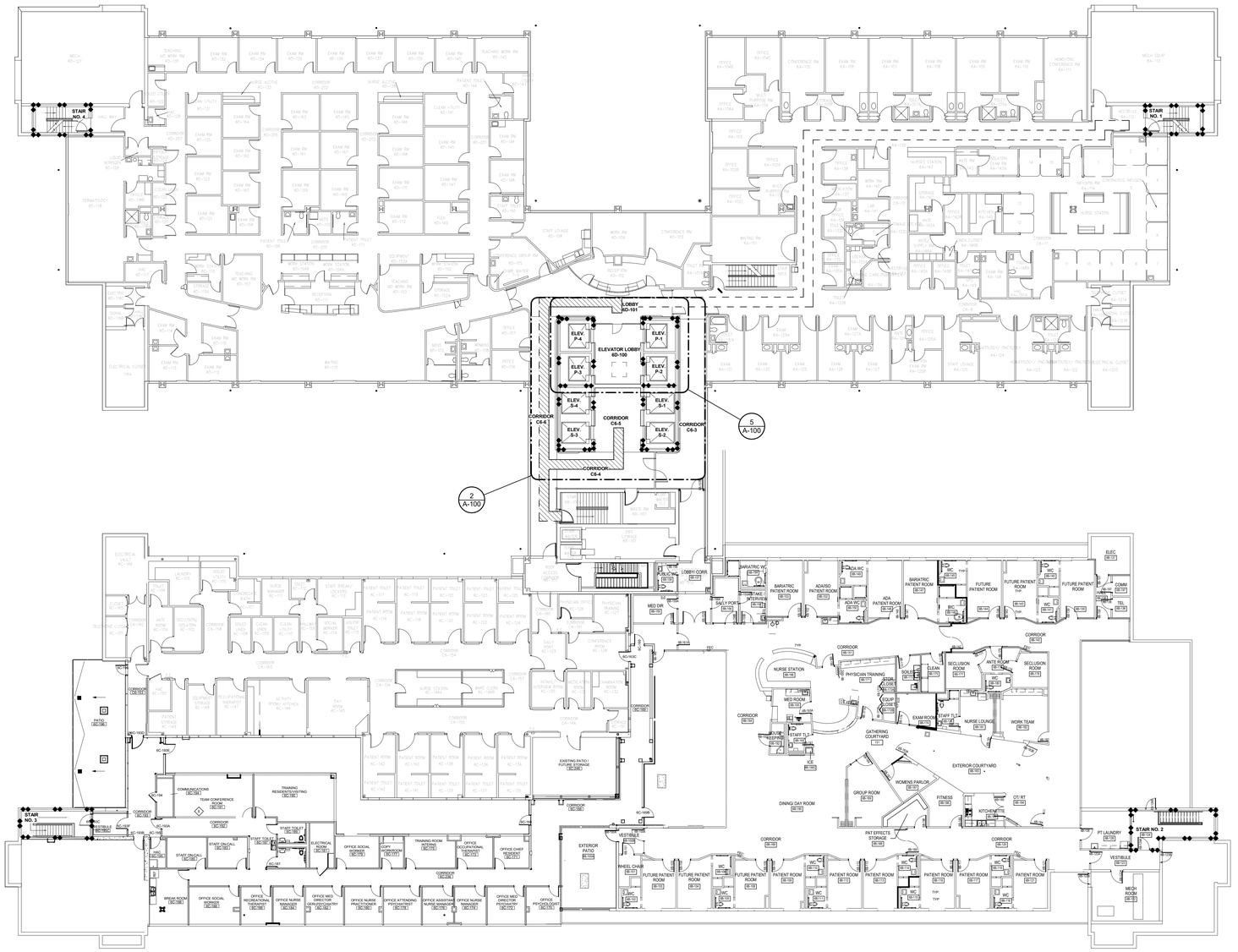
Dwg 10 of 12

1/24/2023 9:23:01 AM

VA FORM 08-6231

DocuSign Envelope ID: 07C43203-E5B9-473E-9D20-707CF31E3BE9

BUILDING 41 - ICRA CONDITION SCHEDULE			
Elevator	Type of Construction	Patient Risk Group	Area Class Designation
SIXTH FLOOR			
P-1	Type C	Group 3	Class III
P-2	Type C	Group 3	Class III
P-3	Type C	Group 3	Class III
P-4	Type C	Group 3	Class III
S-1	Type C	Group 3	Class III
S-2	Type C	Group 3	Class III
S-3	Type C	Group 3	Class III
S-4	Type C	Group 3	Class III



1 BLDG 41 OVERALL SIXTH FLOOR PLAN
Scale: 1/16" = 1'-0"

0 8 16 32 NORTH

SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

C. STICKY MATS AT ALL CONSTRUCTION ACCESS POINTS. STICKYMATS TO BE CHANGED WHEN DIRTY AND AT VA REQUEST.

D. WHERE HOISTWAY DOORS ARE NOT REMAINING OPEN FOR AN EXTENDED PERIOD OF TIME, NO LONGER THAN (1) 8 HOUR SHIFT. PROVIDE NON-RATED ICRA ENCLSURE. BASIS OF DESIGN, STARC OR EDGEGUARD SYSTEMS OR EQUAL. SUBMITTAL REQUIRED.

E. HOISTWAY DOORS MUST BE BARRICADED AT EACH LANDING WHEN HOISTWAY DOORS ARE OPEN.

REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

CONSTRUCTION EGRESS ROUTE

KEY PLAN

SCALE: NO SCALE

AREA OF WORK

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL SIXTH FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

Drawing Number: G-106

Dwg 11 of 12

1/24/2023 9:23:03 AM

VA FORM 08-6231

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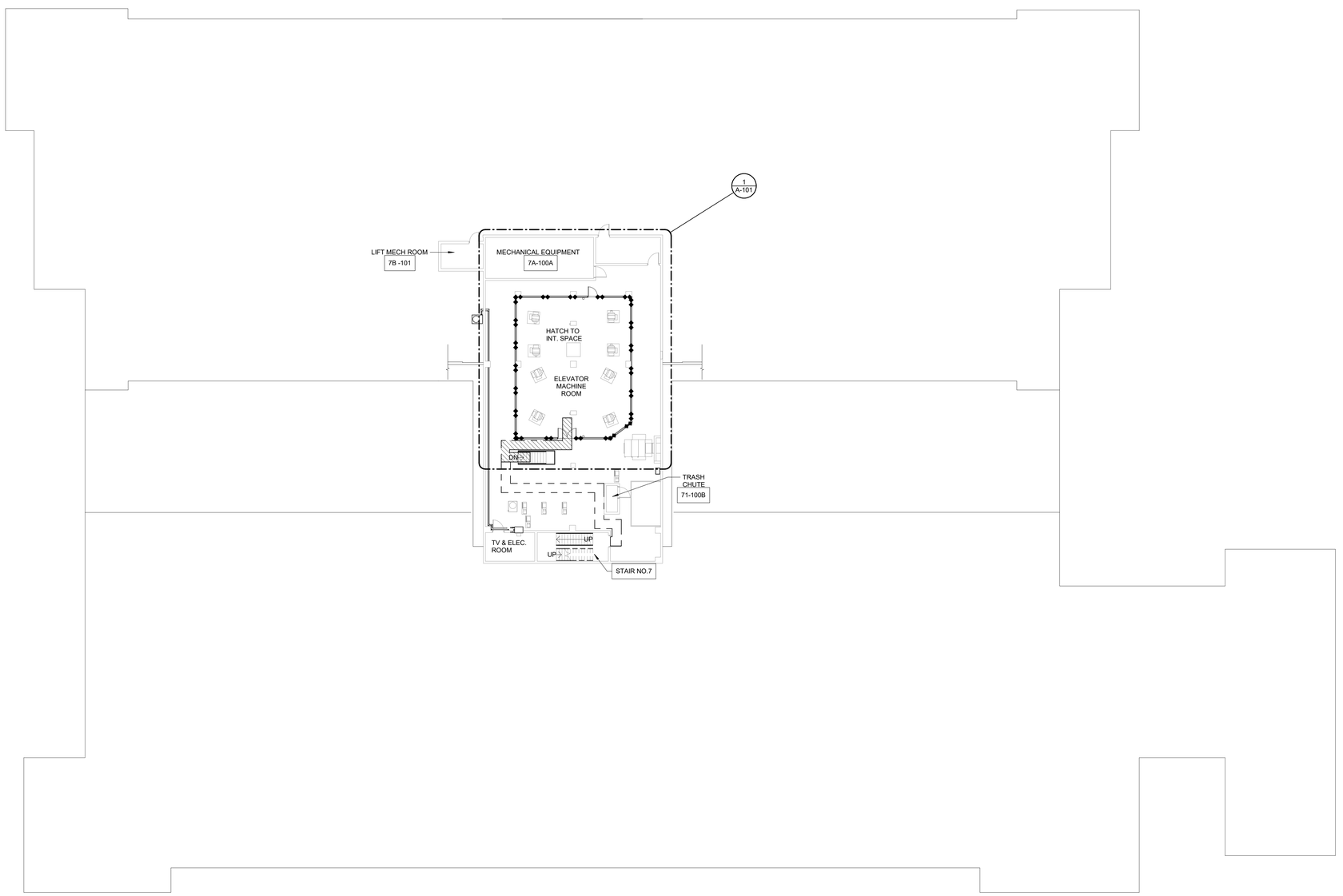


SHEET NOTES:

A. NO MAJOR EQUIPMENT ACCESS THROUGH THE BUILDING BETWEEN 7 AM TO 5PM. CONTRACTOR TO COORDINATE WITH A VA COR.

B. ALL WORK SHALL BE COMPLETED DURING NORMAL WORK HOURS. ANY WORK THAT REQUIRES SHUTTING DOWN BANKS OF ALL 4 ELEVATORS MUST BE AFTER HOURS AND MUST HAVE MINIMUM TWO WEEKS ADVANCE NOTICE. COORDINATE WITH COR.

C. STICKY MATS AT ALL CONSTRUCTION ACCESS POINTS. STICKYMATS TO BE CHANGED WHEN DIRTY AND AT VA REQUEST.

D. WHERE HOISTWAY DOORS ARE NOT REMAINING OPEN FOR AN EXTENDED PERIOD OF TIME, NO LONGER THAN (1) 8 HOUR SHIFT. PROVIDE NON-RATED ICRA ENCLSURE. BASIS OF DESIGN, STARC OR EDGEGUARD SYSTEMS OR EQUAL. SUBMITTAL REQUIRED.

E. HOISTWAY DOORS MUST BE BARRICADED AT EACH LANDING WHEN HOISTWAY DOORS ARE OPEN.

REFERENCE CODES

2018 NFPA 101 LIFE SAFETY CODE
NFPA 99 HEALTH CARE FACILITIES CODE
2018 INTERNATIONAL BUILDING CODE

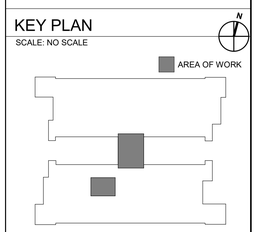
LEGEND

CONSTRUCTION ROUTE - CONSTRUCTION MATERIALS ROUTE

CONSTRUCTION EGRESS ROUTE

KEY PLAN

SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

1 OVERALL PENTHOUSE PLAN
Scale: 1/16" = 1'-0"

0 8 16 32

NORTH

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 OVERALL PENTHOUSE PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER 501-19-101

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Dwg 12 of 12

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T-4 REFERENCE PHOTO A

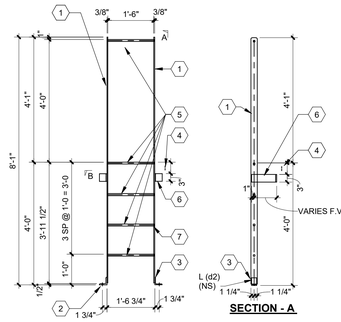
T-4 REFERENCE PHOTO B

GENERAL NOTES

1. INDICATIONS OF PROJECT LIMITS OR LINES OF DEMARCATION ARE SHOWN FOR GENERAL SCOPE DEFINITION AND REFLECT THE UNDERSTANDING OF THE DESIGNER AS TO THE LIMITATIONS OF THE WORK AREA IN AN OCCUPIED AREA. ACTUAL CONTRACT LIMITS ARE TO BE DETERMINED BY AGREEMENT BETWEEN THE COR AND CONTRACTOR BEFORE THE START OF THE WORK.
2. DRAWINGS ARE PREPARED USING DIMENSIONS AND PRODUCT INFORMATION AND DETAILS FOR SPECIFIC PRODUCTS MAY CHANGE BEFORE THEY ARE ACTUALLY INCORPORATED INTO THE WORK. PRODUCTS BY OTHER MANUFACTURERS ARE ALSO ACCEPTABLE. ACTUAL INSTALLATION DETAILS AND DIMENSIONS MAY DIFFER FROM THOSE SHOWN. CONTRACTOR SHALL VERIFY INSTALLATION REQUIREMENTS FOR ALL PRODUCTS TO BE INCORPORATED IN THE WORK AND IS RESPONSIBLE FOR ACCOMMODATING AND COORDINATING CHANGES TO OTHER MATERIALS OR PRODUCTS THAT ARE NECESSARY BECAUSE OF THESE DIFFERENCES.
3. THE DRAWINGS AND SPECIFICATIONS ARE SEPARATED INTO DISCIPLINES FOR CONVENIENCE. THE SEPARATIONS USED ARE USED ONLY FOR THE PURPOSES OF CONVENIENCE AND REFERENCE AND IN NO WAY DO THEY DEFINE OR LIMIT THE SCOPE OR INTENT OF ANY PART OF THE DRAWINGS, OR OF THE DRAWINGS AND SPECIFICATIONS AS A WHOLE. THE FACT THAT THE DRAWINGS ARE SEPARATED IN NO WAY SUGGESTS THAT THE WORK IS NOT TO BE CONSTRUCTED AS A COMPLETE, INTEGRATED AND UNIFIED WHOLE.
4. THE DRAWINGS AND SPECIFICATIONS, INCLUDING DRAWINGS PREPARED BY SPECIFIC ENGINEERING DISCIPLINES ARE COMPLEMENTARY; ITEMS SHOWN IN ANY ONE LOCATION IN THE DRAWINGS SHALL BE CONSIDERED TO BE REQUIREMENTS OF THE CONTRACT FOR CONSTRUCTION. IN THE EVENT OF AN INCONSISTENCY BETWEEN THE DRAWINGS AND SPECIFICATIONS, OR WITHIN EITHER DOCUMENT, THE CONTRACTOR SHALL SEEK CLARIFICATION OR INTERPRETATION FROM THE COR PRIOR TO BIDDING. WHERE INCONSISTENCIES ARE NOT CLARIFIED PRIOR TO BIDDING, AND WHERE THE ACTUAL SOLUTION OR INTENT CANNOT BE REASONABLY INFERRED, THE CONTRACTOR SHALL PROVIDE THE BETTER QUALITY OR GREATER QUANTITY OF WORK.
5. USE OF THE WORD "VERIFY" POINTS OUT A SITUATION WHICH MUST BE CONFIRMED PRIOR TO PROCEEDING WITH THE WORK, FABRICATION OF EQUIPMENT, OR ORDERING MATERIAL. NOTIFY THE COR OF ANY DISCREPANCY DISCOVERED.
6. THE CONTRACTOR SHALL NOTIFY THE COR IMMEDIATELY SHOULD DISCREPANCIES BE FOUND IN THE DRAWINGS AND SPECIFICATIONS.
7. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL FIELD CONDITIONS AND DIMENSIONS AS THEY RELATE TO THIS PROJECT. SHOULD DISCREPANCIES EXIST BETWEEN THE WORK INDICATED AND ACTUAL FIELD CONDITIONS NOTIFY THE COR PRIOR TO PROCEEDING WITH THE WORK.
8. DO NOT SCALE THE DRAWINGS. DRAWING SCALES AS INDICATED ARE FOR REFERENCE ONLY AND ARE NOT INTENDED TO ACCURATELY DEPICT ACTUAL OR DESIGNATED CONDITIONS. WRITTEN DIMENSIONS SHALL GOVERN.
9. COORDINATE WORK OF ALL TRADES PRIOR TO STARTING CONSTRUCTION.
10. THE CONTRACTOR AND SUBCONTRACTORS INVOLVED IN THIS PROJECT SHALL BE RESPONSIBLE FOR DESIGNING AND INSTALLING THEIR RESPECTIVE WORK AND SYSTEMS TO MEET ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, HAZARDOUS WASTE LAWS, ETC. THE CONTRACTOR SHALL FURNISH ALL NECESSARY PERMITS.
11. THE CONTRACTOR SHALL REVIEW THE DRAWINGS AND UNDERSTAND THE SCOPE OF THE DRAWINGS TO BE THE FOLLOWING: THESE CONSTRUCTION DOCUMENTS (DRAWINGS, SPECIFICATIONS, ADDENDA, ETC.) INDICATE THE GENERAL SCOPE OF THE PROJECT IN TERMS OF ARCHITECTURAL DESIGN CONCEPTS, THE DIMENSIONS OF THE BUILDING, THE MAJOR ARCHITECTURAL ELEMENTS, AND THE MAJOR STRUCTURAL, MECHANICAL, ELECTRICAL, AND DATA SYSTEMS. THE DOCUMENTS DO NOT AND ARE NOT INTENDED TO INDICATE OR DESCRIBE IN DETAIL ALL THE NECESSARY WORK REQUIRED FOR FULL PERFORMANCE OF, AND COMPLETION OF THE REQUIREMENTS OF THE CONTRACT. ON THE BASIS OF THE GENERAL SCOPE INDICATED IN THESE DOCUMENTS, THE TRADE CONTRACTORS SHALL FURNISH ALL ITEMS REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THEIR WORK. ALL WORK SHALL BE COMPLETE IN EVERY DETAIL AND THE CONTRACTORS SHALL PROVIDE A ONE YEAR WARRANTY FOR THEIR WORK UNLESS A LONGER WARRANTY IS INDICATED IN THE SPECIFICATIONS.
12. CONTRACTORS SHALL FOLLOW AND OBEY ALL FEDERAL, STATE AND LOCAL CODES, LAWS, SAFETY REGULATIONS AND HAZARDOUS WASTE LAWS, ETC.

ELEVATOR GENERAL NOTES

1. ALL ELEVATORS LOBBIES ARE TO REMAIN OPERATIONAL THROUGHOUT THE CONSTRUCTION OF THIS PROJECT.
2. ALL WORK TO BE PERFORMED IN THE FIRST FLOOR ELEVATOR LOBBIES DURING NORMAL WORK PERIODS. COORDINATE WITH C.O.R. SIXTH FLOOR HEAVY EQUIPMENT HOISTING TO BE PERFORMED OFF HOURS.
3. CONTRACTOR SHALL COORDINATE THE SHUT DOWN OF EACH ELEVATOR WITH THE COR PRIOR TO SHUT DOWN.
4. CONTRACTOR SHALL ENSURE THAT ICRA BARRIERS GO TO STRUCTURAL DECK OR HARD CEILING. WHERE EXISTING WALLS DO NOT GO TO DECK OR HARD CEILING. RETURN ICRA WALLS TO PROVIDE A PROPER ENCLOSURE.
5. CONTRACTOR SHALL ENSURE ALL ICRA BARRIERS ARE CONSTRUCTED AND INSTALLED TO PREVENT INFECTIOUS MATERIAL TO TRANSFER FROM ONE SPACE TO ANOTHER. PROVIDE ENOUGH SPACE FOR CONSTRUCTION WORK TO TAKE PLACE. CONTRACTOR MAY USE A REUSABLE TEMPORARY ICRA BARRIER (EX. STARC SYSTEM TEMPORARY WALL SYSTEMS.)
6. CONTRACTOR SHALL ENSURE THAT THE EGRESS STAIRWAYS REMAIN CLEAR OF CONSTRUCTION MATERIAL, EQUIPMENT AND DEBRIS. NOTHING WILL BE STORED IN STAIRWAY OR STAIR VESTIBULE AT ANYTIME DURING CONSTRUCTION
7. CONTRACTOR TO INSTALL AIR PRESSURE MONITOR OUTSIDE OF SPACES UNDER CONSTRUCTION. A SAFETY REPRESENTATIVE SHALL HAVE ACCESS TO MONITOR WITHOUT ENTERING SPACES UNDER CONSTRUCTION.
8. CONTRACTOR SHALL COMPLETE PHASE IN ITS ENTIRETY BEFORE STARTING A NEW PHASE. ONLY ONE PASSENGER ELEVATOR AND ONE SERVICE ELEVATOR CAN BE OUT OF SERVICE AT ANY ONE PERIOD.
9. CONTRACTOR TO INSTALL A 2 HOUR RATE ICRA PARTITION WITH 90 MIN RATED DOOR AT ENCLOSURE FOR ALL WORK THAT REQUIRES MORE THAN ONE 8 HOUR SHIFT TO COMPLETE THE WORK.



SECTION - A

PIT LADDER KEYNOTES

1. 3/8" x 2 1/2" x 8'-0 1/2" STEEL BAR
2. L2 1/2 x 2 1/2 x 2" WITH HOLE FOR 1/2" ANCHOR BOLT
3. WELD ALL AROUND
4. COORDINATE WITH G.C.
5. 3/4" ROUND NON-SLIP STEEL BAR RUNGS - 5
6. 3/8" x 3" BENT PLATE, WELD TO VERT. RUNGS
7. WELD NON-SLIP STEEL RUNGS ALL AROUND TO VERTICAL STEEL BARS

FABRICATED PIT LADDER TO BE SHOP PRIMED. COORDINATE LOCATIONS WITH ELEVATOR VENDOR FOR CODE COMPLIANCE, SUBMITTAL REQUIRED.

NO FIELD FINISH PAINTING REQUIRED.

ARCHITECTURAL SYMBOL LEGEND

- (#) TYPICAL KEYNOTE
- [#] DEMOLITION KEYNOTE
- MATL 1'-0" CEILING/ SOFFIT HEIGHT
- 101.1 DOOR NUMBER

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ACP/APC	ACOUSTIC CEILING PANEL/ ACOUSTIC PANEL CEILING
ACT	ACOUSTIC(AL) TILE
ADJ	ADJUSTABLE
ADTL	ADDITIONAL
AGG	AGGREGATE
ALT	ALTERNATE
AL	ALUMINUM
APPROX	APPROXIMATE(LY)
ASPH	ASPHALT
AUTO	AUTOMATIC
B/O	BOTTOM OF
BD	BOARD
BLDG	BUILDING
BLKG	BLOCKING
BOT	BOTTOM
BRG	BEARING
℄	CENTERLINE
C/C	CENTER TO CENTER
CJ	CONTROL JOINT
CLL	CONTRACT LIMIT LINE
CEM	CEMENT(ITIOUS)
CMU	CONCRETE MASONRY UNIT
C/G	CEILING
CLR	CLEAR
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CPT	CARPET
CT	CERAMIC TILE
CTR	CENTER(ED)
DF	DRINKING FOUNTAIN
DS	DOWNSPOUT
DBL	DOUBLE
DEG	DEGREE
DEMO	DEMOLITION
DET/DTL	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DWG(S)	DRAWING(S)
E	EAST
EC	ELECTRICAL CONTRACTOR
EHO	ELECTRICAL HOLD OPEN
EJ	EXPANSION JOINT
EW	EACH WAY
EA	EACH
EIFS	EXTERIOR INSULATION FINISH SYSTEM
EL	ELEVATION
ELEC	ELECTRIC(AL)
ELEV	ELEVATOR
EMER	EMERGENCY
EQ	EQUAL
EQUIP	EQUIPMENT
EXIST	EXISTING
EXT	EXTERIOR
EWC	ELECTRIC WATER COOLER
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FFE	FINISH FLOOR ELEVATION
FV	FIELD VERIFY
FEC	FIRE EXTINGUISHER CABINET
FDN	FOUNDATION
FIN	FINISH
FLSHG	FLASHING
FLR	FLOOR
FRMG	FRAMING
FT	FOOT/FEET
FTG	FOOTING
GC	GENERAL CONTRACTOR
GA	GAUGE
GALV	GALVANIZED
GEN	GENERAL
GYP	GYPSUM
HM	HOLLOW METAL
HDWR	HARDWARE
HOL	HOLLOW
HOR	HORIZONTAL
HT	HEIGHT
HVAC	HEATING/VENTILATION/AIR CONDITIONING
ID	INSIDE DIAMETER
IN	INCH
INCL	INCLUDING
INSUL	INSULATION
INT	INTERIOR
JAN	JANITOR
JT	JOINT
LAV	LAVATORY
LB(S)	POUND(S)
L/S	LANDSCAPE
LT	LIGHT
MO	MASONRY OPENING
MAS	MASONRY
MAT'L	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MTL	METAL
N	NORTH
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NOM	NOMINAL
OC	ON CENTER
OD	OUTSIDE DIAMETER
O TO O	OUT TO OUT
OPNG	OPENING
OPP	OPPOSITE
OVHD	OVERHEAD
PEB	PRE-ENGINEERED BUILDING
PJF	PREFORMED JOINT FILLER
PT	PRESSURE TREATED
PERIM	PERIMETER
PL	PLATE
PLAM	PLASTIC LAMINATE
PLBG	PLUMBING
PLYWD	PLYWOOD
PNT	PAINT
PR	PAIR
PTD	PAINTED
PWR	POWER
RB	RUBBER BASE
RD	ROOF DRAIN
RO	ROUGH OPENING
RAD	RADIUS
REC	RECESSED
REINF	REINFORCED
REQ'D	REQUIRED
REV	REVISED (REVISION)
RM	ROOM
S	SOUTH
SB	SPLASH BLOCK
SF	SQUARE FEET
SS	STAINLESS STEEL
SIM	SIMILAR
SPEC	SPECIFICATIONS
SQ	SQUARE
STD	STANDARD
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
SUSP	SUSPENDED
T&G	TONGUE AND GROOVE
T/O	TOP OF
TELE	TELEPHONE
TRTD	TREATED
TS	TUBE STEEL
TYP	TYPICAL
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
VCT	VINYL COMPOSITION TILE
VIF	VERIFY IN FIELD
VERT	VERTICAL
W	WEST
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WWF	WELDED WIRE FABRIC
WD	WOOD
WH	WATER HEATER
WT	WEIGHT

GENERAL SYMBOL LEGEND

- DETAIL # / PAGE # — WALL SECTION SYMBOL
- DETAIL # / PAGE # — BUILDING SECTION SYMBOL
- DETAIL # / PAGE # — DETAIL SECTION SYMBOL
- DETAIL # / PAGE # — INTERIOR ELEVATION SYMBOL
- DETAIL # / PAGE # — EXTERIOR ELEVATION SYMBOL
- XX.X — COLUMN GRID
- XX.X — WALL GRID (REPRESENTS FACE OF EXISTING WALL)
- ELEVATION — ELEVATION SYMBOL
- ROOM NAME 101A — ROOM DESIGNATION SYMBOL
- ROOF SLOPE DIRECTION SYMBOL
- 1 — REVISION NOTE
- BREAK LINE
- 1 / A8.1 — ENLARGED DETAIL CALLOUT
- TRUE NORTH — TRUE NORTH ARROW
- PLAN NORTH — PROJECT NORTH ARROW
- 0 4 8 16 — TYPICAL GRAPHIC SCALE

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO — WALTER DAVID VANSCOTER ARC.1716954 — REGISTERED ARCHITECT — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ARCHITECTURAL SYMBOLS, ABBREVIATIONS AND NOTES

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number A-001

Dwg 1 of 6

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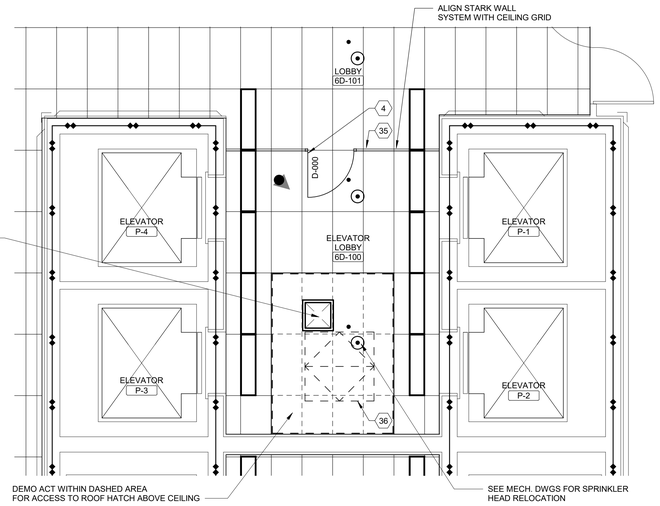


5 BLDG 41 PARTIAL 6TH FLOOR RCP AND ICRA PLAN

Scale: 1/4" = 1'-0"

0 4 8 16 NORTH

PHOTO LEGEND

PHOTO LOCATION AND DIRECTION

3 REFERENCE PHOTO

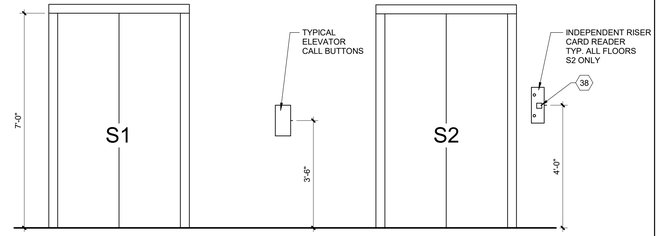
Scale: 1" = 1'-0"

BUILDING 41 JAMB FINISH SCHEDULE

ELEVATOR	RE-CLAD/RE-PAINT	REPLACE	COMMENTS
GROUND FLOOR - BUILDING 41			
P-1	X		SEE INTERIOR ELEVATIONS A-301
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		
FIRST FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		
SECOND FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		
THIRD FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		

BUILDING 41 JAMB FINISH SCHEDULE

ELEVATOR	RE-CLAD/RE-PAINT	REPLACE	COMMENTS
FOURTH FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		
FIFTH FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		
SIXTH FLOOR - BUILDING 41			
P-1	X		
P-2	X		
P-3	X		
P-4	X		
S-1	X		
S-2	X		
S-3	X		
S-4	X		



1 TYPICAL ELEVATOR FIXTURE MOUNTING HEIGHT DIAGRAM, ALL FLOORS

Scale: 1/2" = 1'-0"

KEY NOTES:

##	
1	REMOVE EXISTING CAB FLOOR FINISH & SUBFLOOR. PER SPECIFICATION
2	REMOVE EXISTING CAB CEILING AND LIGHTS PER SPECIFICATION
3	REMOVE EXISTING CAB WALL FINISHES PER SPECIFICATION SECTION
4	REMOVE EXISTING PIT LADDER
5	REMOVE ELEVATOR EQUIPMENT AS PER SPECIFICATION 14 21 10 - TRACTION ELEVATORS
6	NOT USED.
7	REMOVE EXISTING HOISTWAY DOOR PER SPECIFICATION SECTION
8	REMOVE EXISTING SIGNAL DEVICE AND LANTERN AS PER SPECIFICATION SECTION
9	REMOVE PORTION OF EXISTING WALL TO GAIN ACCESS TO SHAFT
10	EXISTING FENCING - APPROXIMATELY 6' HIGH TO BE REMOVED.

KEY NOTES:

#	
1	INSTALL NEW HOISTWAY DOORS PER SPECIFICATION SECTIONS
2	NEW FINISHES - SEE ROOM FINISH SCHEDULE
3	EXISTING DOOR TO REMAIN.
4	NON-RATED ICRA ENCLOSURE. SEE SHEET G-004
5	WALK OFF MAT, SEE 1/G-004 FOR MAT INSIDE ENCLOSURE, TYPICAL.
6	PROVIDE TEMP. EGRESS DOOR IN ICRA BARRIER WALL. SEE SHEET G-004 FOR FRAME AND HARDWARE INFO.
7	PROVIDE NEW LIGHTING IN PITS AND SHAFTS. SEE ELECTRICAL DRAWINGS
8	INSTALL NEW PIT LADDER - SEE SHEET A-301. COORDINATE LOCATION WITH ELEVATOR CONTRACTOR FOR CODE COMPLIANCE. SHOP DRAWINGS REQUIRED SHOWING LOCATION PER ELEVATOR.
9	HVAC EQUIPMENT - SEE MECHANICAL DRAWINGS
10	ELEVATOR MACHINE ROOM EQUIPMENT SEE SPECIFICATION SECTION
11	ELEVATOR DOOR JAMBS, SEE JAMB FINISH SCHEDULE
12	REPLACE CAB FINISHES PER SPECIFICATION SECTION 14 24 00, SEE SHEETS A-401 AND A-402 FOR INTERIOR ELEVATIONS AND FINISH MATERIALS
13	PATCH AND REPAIR AND PAINT ALL GYPSUM BOARD DAMAGED OR ALTERED DUE TO NEW ELEVATOR WORK. INCLUDING BUT NOT LIMITED TO RE-FINISHING JAMB WORK AND CONTROL DEVICE AND LANTERN CHANGE OUT WORK
14	REMOVE EXISTING DOOR AND REPLACE WITH NEW DOOR AND FRAME.
15	EXISTING ACCESS DOOR TO REMAIN
16	PATCH AND REPAIR ALL HOLES IN GWB PRIOR TO PAINTING, ALL HOLES TO BE SEALED W/ FIRESTOPPING
17	MAINTAIN MINIMUM CORRIDOR WIDTH OF 6'-0" AT ALL TIMES.
18	PATCH EXISTING CEILING OPENING
19	PATCH EXISTING OPENING ABOVE CEILING. MAINTAIN FIRE RATING. FINISH TO MATCH ADJACENT SURFACES.
20	PLUMBING EQUIPMENT - SEE PLUMBING DRAWINGS
21	HATCH DOWN TO 6TH FLOOR CEILING
22	NEW LOUVER - BASIS OF DESIGN: RUSKIN EME3625 WIND-DRIVEN RAIN RESISTANT STATIONARY LOUVER, VERTICAL LOUVER, ALUM., FLANGE MOUNT, COLOR TO MATCH EXISTING BRICK AS CLOSE AS POSSIBLE FROM MANUFACTURER'S STANDARD COLOR RANGE - OR EQUAL. VIF SIZE.
23	BUILD NEW TEMP. PARTITION WITH ACCESS DOOR.
24	EXISTING RATED DOOR MAINTAINS CORRIDOR WALL RATING.
25	INSTALL PLASTIC BARRIER WITH ZIPPER ACCESS
26	HEPA FILTER REQUIRED. COORDINATE EXHAUST LOCATION IN INTERSTITIAL SPACE WITH C.O.R.
27	RATED ENCLOSURE SHOWN AT ONE LOCATION ONLY FOR CLARITY. ENCLOSURE TO BE MOVED AS ELEVATOR WORK PROGRESSES FROM ELEVATOR. SEE PHASING NOTES SHEET G-100
28	NON RATED ENCLOSURE SHOWN AT ONE LOCATION ONLY FOR CLARITY. ENCLOSURE TO BE MOVED AS ELEVATOR WORK PROGRESSES FROM ELEVATOR TO ELEVATOR. SEE PHASING NOTES SHEET G-100
29	INSTALL NEW TEMP. RATED DOOR TO MAINTAIN SHAFT WALL RATING, SEE DOOR SCHEDULE ON SHEET G-004 FOR TEMPORARY DOORS. COORDINATE W/ COR.
30	NEW 2 HOUR PARTITION, SEE PARTITION TYPES G-004, TIGHT TO UNDERSIDE OF STRUCTURE ABOVE. NOTE: MULTIPLE PIPE AND DUCT PENETRATIONS THROUGH NEW WALL (APPROX. 75 PENETRATIONS). CONTRACTOR TO VISUALLY INSPECT AREA FOR EXACT COUNT AND TYPES OF PENETRATIONS PRIOR TO SUBMITTING BID.
31	EXISTING CONCRETE COLUMNS.
32	BASEMENT FLOOR IS THE ON GRADE MAIN ACCESS POINT TO ELEVATORS. CONTRACTOR TO NOT LEAVE HOISTWAYS DOORS OPEN LONGER THAN ONE 8 HOUR SHIFT, ALLOWING USE OF NON RATED PREFABRICATED ENCLOSURE. DOORS TO BE KEPT CLOSED TO EXTENT POSSIBLE, COORDINATE WITH COR. TYPICAL, P-1 THRU P-4 AND S-1 THRU S-4.
33	PAINT BOTH SIDES OF NEW PARTITION FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE SEE PAINTING SPECS. COLOR TO BE SELECTED BY VA
34	EPOXY FLOOR COATING, BASIS OF DESIGN: SHERWIN WILLIAMS, ARMORSEAL 1000 HS HIGH SOLIDS, HEAVY DUTY TWO COMPONENT EPOXY COATING WITH SKID INHIBITING ADDITIVE OR APPROVED EQUAL, ENTIRE FLOOR EXTENT ROOM 600 ONLY.
35	TEMPORARY PARTITION CONSTRUCTION TO TAKE PLACE OFF HOURS. COORDINATE WITH COR.
36	HATCH TO ELEVATOR MACHINE ROOM LOCATED ABOVE CEILING
37	RELOCATED CONDENSING UNIT - SEE MECHANICAL DRAWINGS. SET UNIT ON (BASIS OF DESIGN) DURA-BLOK TYPE RECYCLED RUBBER SUPPORT BASE
38	NEW CARD READER

6 BLDG 41 P-1, P-2, P-3, P-4, S-1, S-2, S-3 & S-4 ELEVATOR PLAN - PIT

Scale: 1/4" = 1'-0"

0 4 8 16 NORTH

NOTE: BASEMENT IS ON GRADE ACCESS FLOOR

4 BLDG 41 P-1, P-2, P-3, P-4, S-1, S-2, S-3 & S-4 ELEVATOR PLAN - BASEMENT

Scale: 1/4" = 1'-0"

0 4 8 16 NORTH

2 BLDG 41 P-1, P-2, P-3, P-4, S-1, S-2, S-3 & S-4 ELEVATOR PLAN - FIRST THRU SIXTH FLOOR

Scale: 1/4" = 1'-0"

0 4 8 16 NORTH

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 ENLARGED ELEVATOR P-1, P-2, P-3, P-4, S-1, S-2, S-3, S-4 PLANS AND DETAILS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number A-100

Dwg 2 of 6

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VA FORM 08-6231

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BUILDING 41 JAMB FINISH SCHEDULE

ELEVATOR	RE-PAINT	REPLACE	COMMENTS
BASEMENT FLOOR - BUILDING 41			
S-5	X		COLOR TO BE SELECTED BY VA
FIRST FLOOR - BUILDING 41			
S-5	X		COLOR TO BE SELECTED BY VA

BUILDING 41 JAMB FINISH SCHEDULE

ELEVATOR	REFINISH	REPLACE	COMMENTS
BASEMENT FLOOR - BUILDING 41			
T-4		X	SEE SPECIFICATION SECTION 14 12 11
THIRD FLOOR - BUILDING 41			
T-4		X	

BUILDING 41 - DOOR AND FRAME SCHEDULE

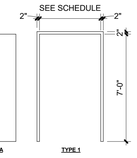
DOOR INFORMATION							FRAME INFORMATION			MISCELLANEOUS		
NO.	QTY.	WIDTH	HEIGHT	THICK.	TYPE	MAT'L	TYPE	MAT'L	DEPTH	RATING	HRDWR.	REMARKS
D600	(1)	3'-0"	7'-0"	1 3/4"	TYPE A	HM	TYPE 1	HM	6 5/8"	90 MIN.	SET 1	
D601	(2)	3'-0"	7'-0"	1 3/4"	TYPE A	HM	TYPE 1	HM	6 5/8"	90 MIN.	SET 2	DOUBLE DOOR

HARDWARE SET 1

3	HINGES	TA2714	630	MK
1	DUST PROOF STRIKE	570	32D	RO
1	LATCH SET	VA SPEC F01	26D	
1	DOOR CLOSER	DC6210xA11	689	CO
2	KICK PLATES	K1050F	32D	RO
1	GASKETING	S88C x HEAD & JAMBS		PE

HARDWARE SET 2

6	HINGES	TA2714	630	MK
1	FLUSH BOLTS	2845	32D	RO
1	DUST PROOF STRIKE	570	32D	RO
1	LATCH SET	VA SPEC F01	26D	
1	COORDINATOR	2600 SERIES	32D	RO
1	ASTRAGAL	BY DOOR MANUF.		
2	DOOR CLOSER	DC6210xA11	689	CO
4	KICK PLATES	K1050F	32D	RO
1	GASKETING	S88C x HEAD & JAMBS		PE



NOTE: ALL HM DOORS AND FRAMES TO BE SUPPLIED PRIME COATED. FINISH COAT FIELD PAINT APPLIED. USE LOW GLOSS OIL BASED PAINT, SUBMITTAL REQUIRED. COLOR TO BE SELECTED BY VA

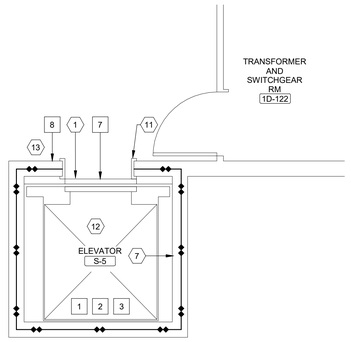
MANUFACTURERS:

CORBIN RUSSWIN	CO
McKINNEY	MK
PEMKO	PE
ROCKWOOD	RO

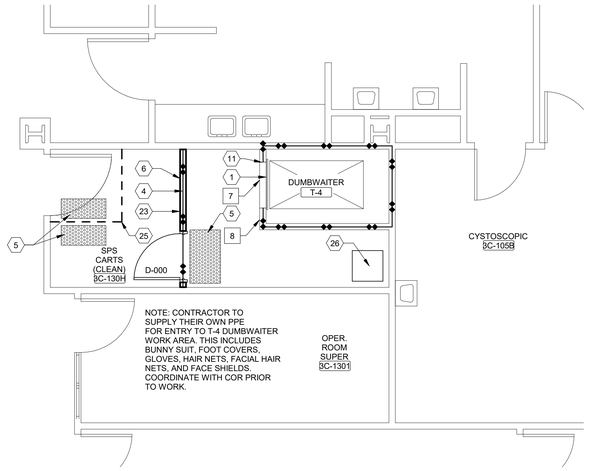
NOTE:

HARDWARE MANUFACTURER'S LISTED AS BASIS OF DESIGN. ALTERNATE MANUFACTURERS ACCEPTABLE, SUBJECT TO REVIEW BY ARCHITECT AND C.O.R. FOR EQUAL QUALITY COMPLIANCE

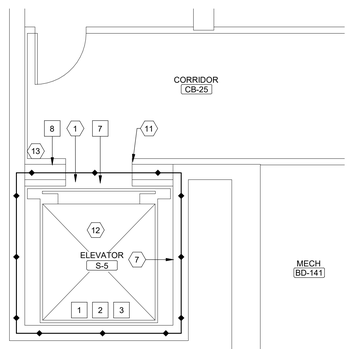
COORDINATE CORE TYPE WITH C.O.R. AND VA



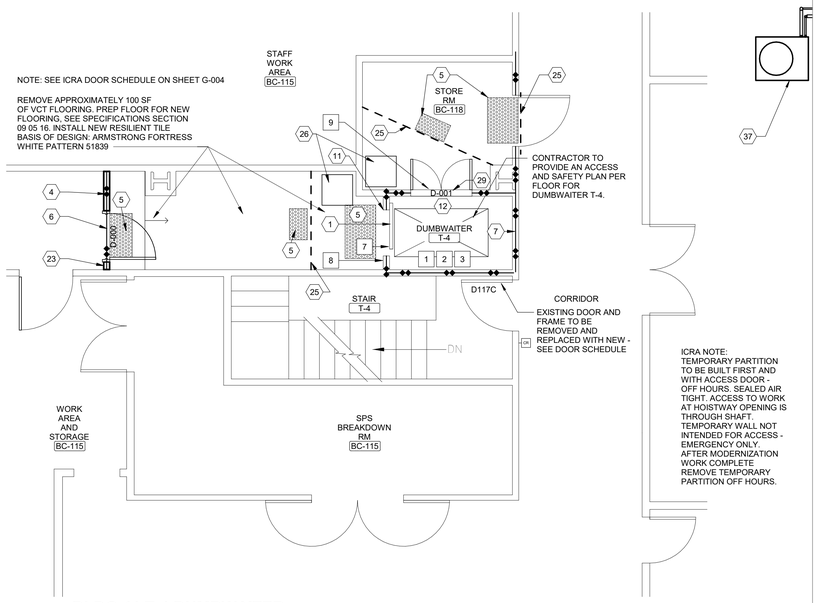
5 BLDG 41 S-5 ELEVATOR PLAN - FIRST FLOOR
Scale: 1/4" = 1'-0"



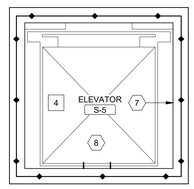
2 BLDG 41 T-4 DUMBWAITER PLAN - THIRD FLOOR
Scale: 1/4" = 1'-0"



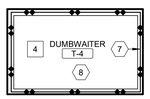
6 BLDG 41 S-5 ELEVATOR PLAN - BASEMENT
Scale: 1/4" = 1'-0"



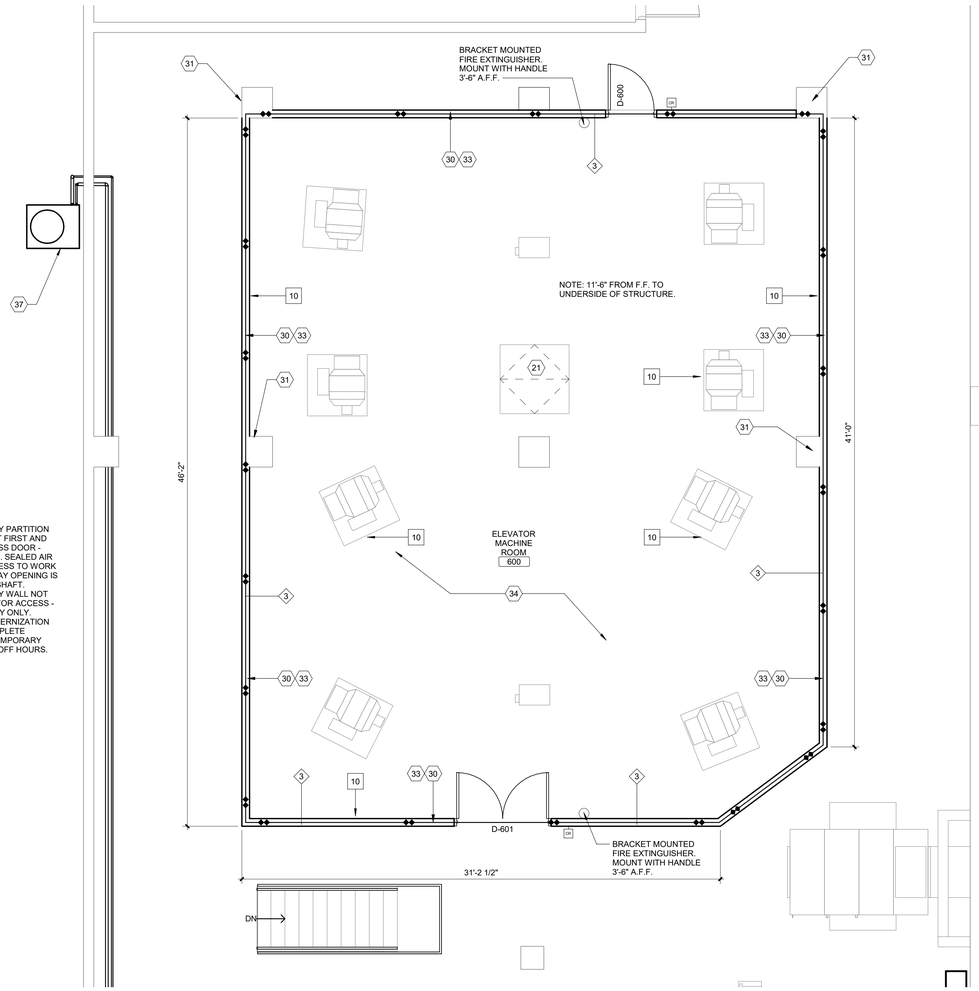
3 BLDG 41 T-4 DUMBWAITER PLAN - BASMENT
Scale: 1/4" = 1'-0"



7 BLDG 41 S-5 ELEVATOR PLAN - PIT
Scale: 1/4" = 1'-0"



4 BLDG 41 T-4 DUMBWAITER PLAN - PIT
Scale: 1/4" = 1'-0"



1 BLDG 41 P-1, P-2, P-3, P-4, S-1, S-2, S-3 & S-4 ELEVATOR PLAN - PENTHOUSE
Scale: 1/4" = 1'-0"

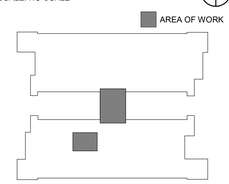
KEY NOTES:

##	
1	REMOVE EXISTING CAB FLOOR FINISH & SUBFLOOR. PER SPECIFICATION
2	REMOVE EXISTING CAB CEILING AND LIGHTS PER SPECIFICATION
3	REMOVE EXISTING CAB WALL FINISHES PER SPECIFICATION SECTION
4	REMOVE EXISTING PIT LADDER
5	REMOVE ELEVATOR EQUIPMENT AS PER SPECIFICATION 14 21 10 - TRACTION ELEVATORS
6	NOT USED.
7	REMOVE EXISTING HOISTWAY DOOR PER SPECIFICATION SECTION
8	REMOVE EXISTING SIGNAL DEVICE AND LANTERN AS PER SPECIFICATION SECTION
9	REMOVE PORTION OF EXISTING WALL TO GAIN ACCESS TO SHAFT
10	EXISTING FENCING - APPROXIMATELY 6' HIGH TO BE REMOVED.

KEY NOTES:

#	
1	INSTALL NEW HOISTWAY DOORS PER SPECIFICATION SECTIONS
2	NEW FINISHES - SEE ROOM FINISH SCHEDULE
3	EXISTING DOOR TO REMAIN.
4	NON-RATED ICRA ENCLOSURE. SEE SHEET G-004
5	WALK OFF MAT, SEE 1/G-004 FOR MAT INSIDE ENCLOSURE, TYPICAL.
6	PROVIDE TEMP. EGRESS DOOR IN ICRA BARRIER WALL. SEE SHEET G-004 FOR FRAME AND HARDWARE INFO.
7	PROVIDE NEW LIGHTING IN PITS AND SHAFTS. SEE ELECTRICAL DRAWINGS
8	INSTALL NEW PIT LADDER - SEE SHEET A-301. COORDINATE LOCATION WITH ELEVATOR CONTRACTOR FOR CODE COMPLIANCE. SHOP DRAWINGS REQUIRED SHOWING LOCATION PER ELEVATOR.
9	HVAC EQUIPMENT - SEE MECHANICAL DRAWINGS
10	ELEVATOR MACHINE ROOM EQUIPMENT SEE SPECIFICATION SECTION
11	ELEVATOR DOOR JAMBS, SEE JAMB FINISH SCHEDULE
12	REPLACE CAB FINISHES PER SPECIFICATION SECTION 14 24 00, SEE SHEETS A-401 AND A-402 FOR INTERIOR ELEVATIONS AND FINISH MATERIALS
13	PATCH AND REPAIR AND PAINT ALL GYPSUM BOARD DAMAGED OR ALTERED DUE TO NEW ELEVATOR WORK. INCLUDING BUT NOT LIMITED TO RE-FINISHING JAMB WORK AND CONTROL DEVICE AND LANTERN CHANGE OUT WORK
14	REMOVE EXISTING DOOR AND REPLACE WITH NEW DOOR AND FRAME.
15	EXISTING ACCESS DOOR TO REMAIN
16	PATCH AND REPAIR ALL HOLES IN GWB PRIOR TO PAINTING, ALL HOLES TO BE SEALED W/ FIRESTOPPING
17	MAINTAIN MINIMUM CORRIDOR WIDTH OF 6'-0" AT ALL TIMES.
18	PATCH EXISTING CEILING OPENING
19	PATCH EXISTING OPENING ABOVE CEILING. MAINTAIN FIRE RATING. FINISH TO MATCH ADJACENT SURFACES.
20	PLUMBING EQUIPMENT - SEE PLUMBING DRAWINGS
21	HATCH DOWN TO 6TH FLOOR CEILING
22	NEW LOUVER - BASIS OF DESIGN: RUSKIN EME3625 WIND-DRIVEN RAIN RESISTANT STATIONARY LOUVER, VERTICAL LOUVER, ALUM., FLANGE MOUNT, COLOR TO MATCH EXISTING BRICK AS CLOSE AS POSSIBLE FROM MANUFACTURER'S STANDARD COLOR RANGE - OR EQUAL. VIF SIZE.
23	BUILD NEW TEMP. PARTITION WITH ACCESS DOOR.
24	EXISTING RATED DOOR MAINTAINS CORRIDOR WALL RATING.
25	INSTALL PLASTIC BARRIER WITH ZIPPER ACCESS
26	HEPA FILTER REQUIRED. COORDINATE EXHAUST LOCATION IN INTERSTITIAL SPACE WITH C.O.R.
27	RATED ENCLOSURE SHOWN AT ONE LOCATION ONLY FOR CLARITY. ENCLOSURE TO BE MOVED AS ELEVATOR WORK PROGRESSES FROM ELEVATOR. SEE PHASING NOTES SHEET G-100
28	NON RATED ENCLOSURE SHOWN AT ONE LOCATION ONLY FOR CLARITY. ENCLOSURE TO BE MOVED AS ELEVATOR WORK PROGRESSES FROM ELEVATOR TO ELEVATOR. SEE PHASING NOTES SHEET G-100
29	INSTALL NEW TEMP. RATED DOOR TO MAINTAIN SHAFT WALL RATING. SEE DOOR SCHEDULE ON SHEET G-004 FOR TEMPORARY DOORS. COORDINATE W/ COR.
30	NEW 2 HOUR PARTITION, SEE PARTITION TYPES G-004, TIGHT TO UNDERSIDE OF STRUCTURE ABOVE. NOTE: MULTIPLE PIPE AND DUCT PENETRATIONS THROUGH NEW WALL (APPROX. 75 PENETRATIONS). CONTRACTOR TO VISUALLY INSPECT AREA FOR EXACT COUNT AND TYPES OF PENETRATIONS PRIOR TO SUBMITTING BID.
31	EXISTING CONCRETE COLUMNS.
32	BASEMENT FLOOR IS THE ON GRADE MAIN ACCESS POINT TO ELEVATORS. CONTRACTOR TO NOT LEAVE HOISTWAYS DOORS OPEN LONGER THAN ONE 8 HOUR SHIFT, ALLOWING USE OF NON RATED PREFABRICATED ENCLOSURE. DOORS TO BE KEPT CLOSED TO EXTENT POSSIBLE, COORDINATE WITH COR. TYPICAL, P-1 THRU P-4 AND S-1 THRU S-4.
33	PAINT BOTH SIDES OF NEW PARTITION FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE SEE PAINTING SPECS. COLOR TO BE SELECTED BY VA
34	EPOXY FLOOR COATING, BASIS OF DESIGN: SHERWIN WILLIAMS, ARMORSEAL 1000 HS HIGH SOLIDS, HEAVY DUTY TWO COMPONENT EPOXY COATING WITH SKID INHIBITING ADDITIVE OR APPROVED EQUAL, ENTIRE FLOOR EXTENT ROOM 600 ONLY.
35	TEMPORARY PARTITION CONSTRUCTION TO TAKE PLACE OFF HOURS. COORDINATE WITH COR.
36	HATCH TO ELEVATOR MACHINE ROOM LOCATED ABOVE CEILING
37	RELOCATED CONDENSING UNIT - SEE MECHANICAL DRAWINGS. SET UNIT ON (BASIS OF DESIGN) DURA-BLOK TYPE RECYCLED RUBBER SUPPORT BASE
38	NEW CARD READER

KEY PLAN
SCALE: NO SCALE



WALL RATING LEGEND

- 1 HR - FIRE SEPARATION
- 2 HR - FIRE SEPARATION
- SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:
ACG Project Number 19-262

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420
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Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 S-5 ENLARGED ELEVATOR PLANS AND T-4 ENLARGED DUMBWAITER PLANS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101
Building Number: # 41
Drawing Number: A-101
Dwg 3 of 6

Approved: Project Director
Date: JANUARY 27, 2023
Checked: WVS
Drawn: EJD

1/24/2023 9:26:16 AM

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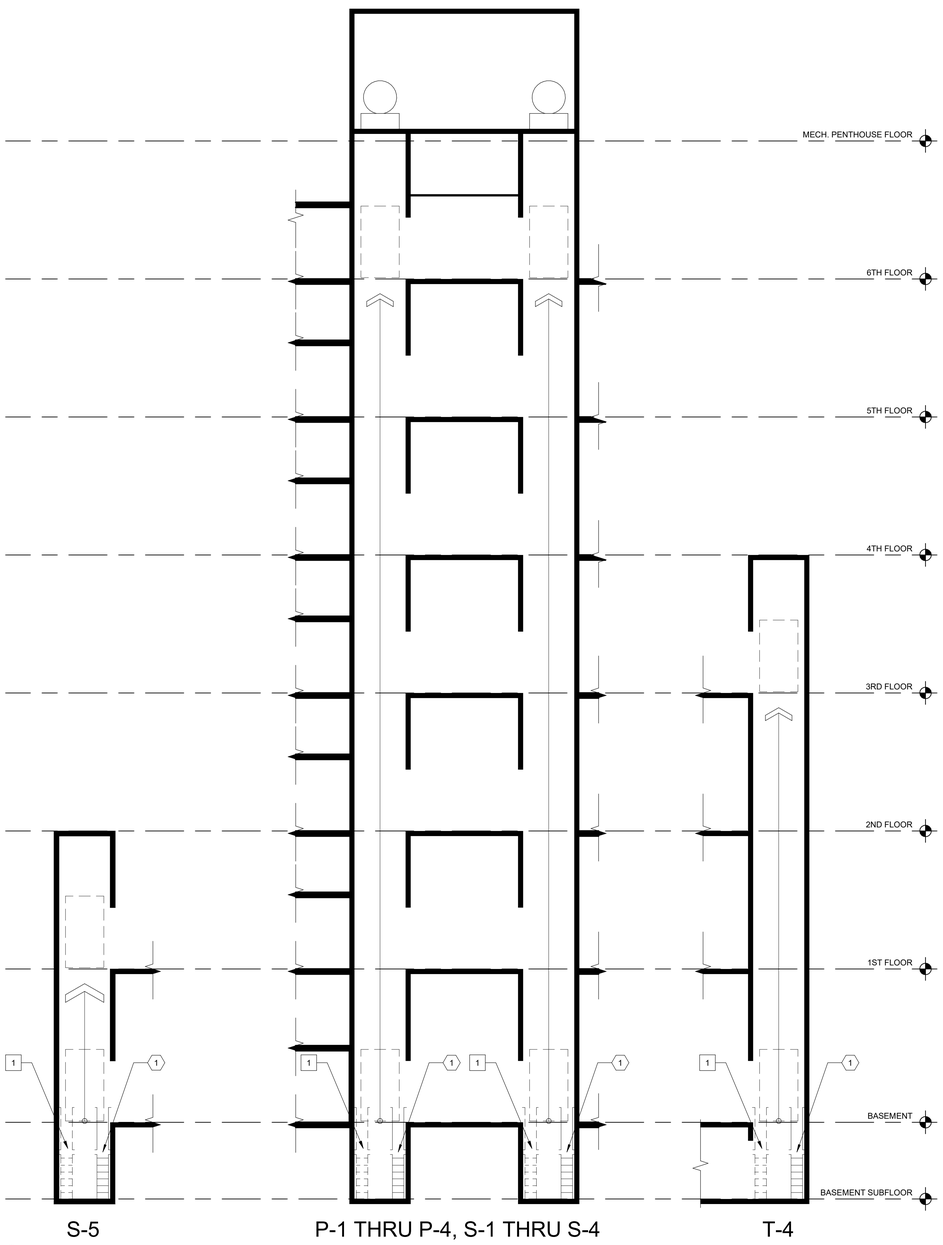
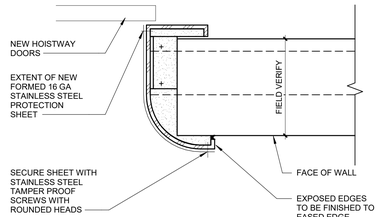


7 SCHEMATIC ELEVATOR SECTION - BDLG 41 ELEVATORS

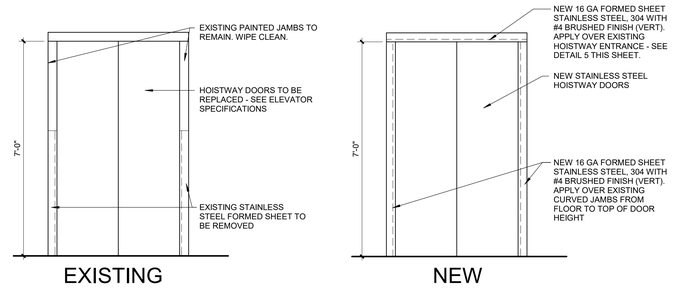
Scale: 1/8" = 1'-0"



SUBMITTAL REQUIRED SHOWING PLAN DETAIL AND ELEVATION SHOWING FASTENER SPACING AND LOCATIONS.

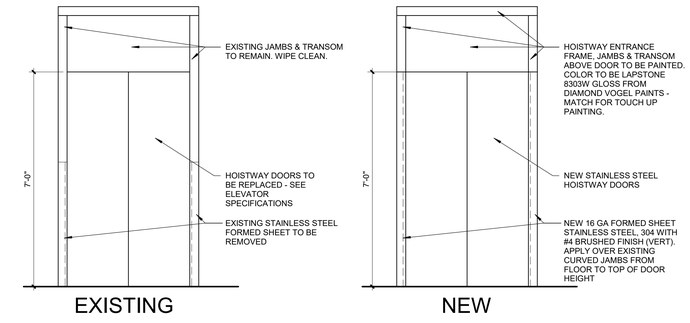
6 NEW CURVED JAMB DETAIL

Scale: 3" = 1'-0"



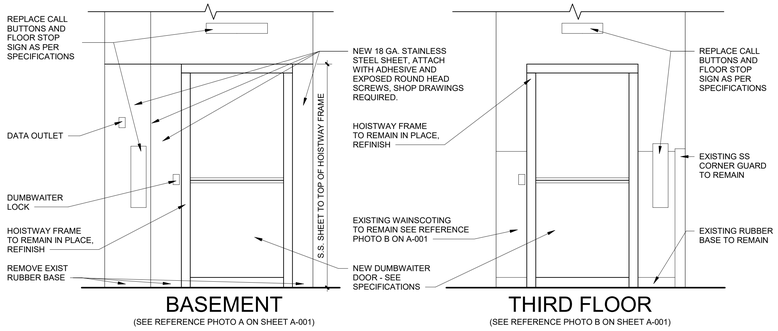
1 P1-P4 & S1-S4, BUILDING 41, FLOORS 2 THRU 6 HOISTWAY ENTRANCE ELEVATION

Scale: 1/2" = 1'-0"



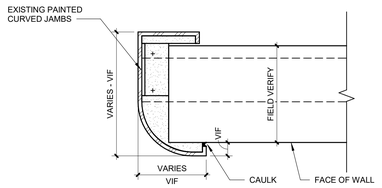
2 P1-P4 & S1-S4, BUILDING 41, FIRST FLOOR HOISTWAY ENTRANCE ELEVATION

Scale: 1/2" = 1'-0"



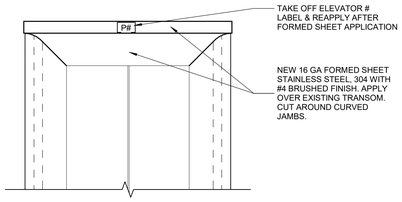
3 T-4 HOISTWAY ENTRANCE ELEVATION, BASEMENT & THIRD FLOOR

Scale: 1/2" = 1'-0"



5 EXISTING CURVED JAMB DETAIL

Scale: 3" = 1'-0"



4 P1-P4 & S1-S4, BUILDING 41, FLOORS 2 THRU 6 HOISTWAY ENTRANCE PERSPECTIVE 3D VIEW

Scale: No Scale

SHEET NOTES:

A. CONTRACTOR TO PROTECT WORK TO REMAIN FROM DAMAGE DURING DEMOLITION.

B. ALL CONSTRUCTION DEBRIS IS TO BE REMOVED FROM SITE EACH DAY AND DISPOSED OF PROPERLY PER CONTRACT REQUIREMENTS.

C. CONTRACTOR TO PROVIDE PROTECTIVE BARRIERS, WARNING SIGNS AND TEMPORARY PATHWAYS IN AREAS THAT WILL BE OPERATING DURING THE CONSTRUCTION PHASE.

D. PROVIDE DUST AND DEBRIS BARRIER IN ACCORDANCE WITH ICRA REQUIREMENT.

E. CONTRACTOR TO PATCH ANY WORK TO REMAIN THAT WAS DAMAGED DURING DEMOLITION TO MATCH EXISTING REMAINING.

F. CONTRACTOR TO ENSURE TO NOT DAMAGE RATED SHAFT WALLS OR FIRE / SMOKE RATED PARTITIONS. ANY RATED WALLS DAMAGED DURING CONSTRUCTION ARE TO BE REPAIRED PER RATED PARTITION REQUIREMENTS.

G. VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY THE COR OF ANY CONFLICTS PRIOR TO PROCEEDING WITH DEMOLITION.

H. REFER TO MECHANICAL, ELECTRICAL, AND COMMUNICATION DOCUMENTS FOR RESPECTIVE DEMOLITION AND NEW WORK INFORMATION.

I. ASBESTOS IS PRESENT IN THE BUILDING (CEILING, FLOOR TILE MASTIC, PIPING COMPONENTS, ETC.) ABATE ALL ASBESTOS THAT IS DISTURBED AS A RESULT OF WORK PER SPECIFICATIONS.

J. SPRINKLER HEADS TO BE TURNED UP DURING CONSTRUCTION WHERE CEILINGS HAVE BEEN REMOVED.

K. ELEVATOR WORK TO BE PERFORMED ONE PASSENGER ELEVATOR AND ONE SERVICE ELEVATOR AT A TIME. NO MORE THAN ONE ELEVATOR CAN BE SECURED AT ANY POINT.

L. USE OF TEMPORARY ICRA BARRIERS, I.E. STARC WALL, TO BE USED IN ALL ELEVATOR LOBBIES. MUST USE MATCHING RATED WALL FOR ICRA BARRIERS. AT RATED CONDITIONS.

KEY NOTES:

1 REMOVE EXISTING PIT LADDER.

KEY NOTES:

1 INSTALL NEW PIT LADDER - SEE DETAIL ON A-001. COORDINATE LOCATION WITH ELEVATOR CONTRACTOR FOR CODE COMPLIANCE. SHOP DRAWINGS REQ'D SHOWING LOCATION PER ELEVATOR.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO — WALTER DAVID VANSCOTER — ARC.1716954 — REGISTERED ARCHITECT — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: SCHEMATIC ELEVATOR SECTIONS AND DETAILS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER 501-19-101

Building Number # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

Drawing Number A-301

Dwg 4 of 6

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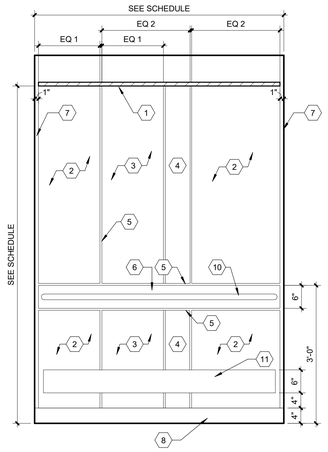
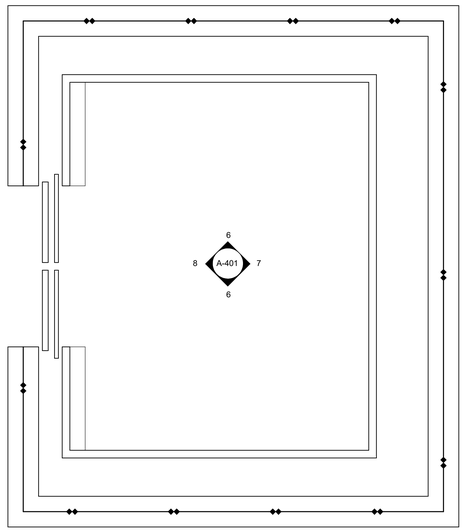
PASSENGER ELEVATOR CAB SIZE SCHEDULE				
BUILDING	ELEVATOR	WIDTH	DEPTH	CEILING HEIGHT
41	P-1	92"	66"	88"
41	P-2	92"	66"	88"
41	P-3	92"	66"	88"
41	P-4	92"	66"	88"



6 CAB SIDE INTERIOR ELEVATION

Scale: 3/4" = 1'-0"

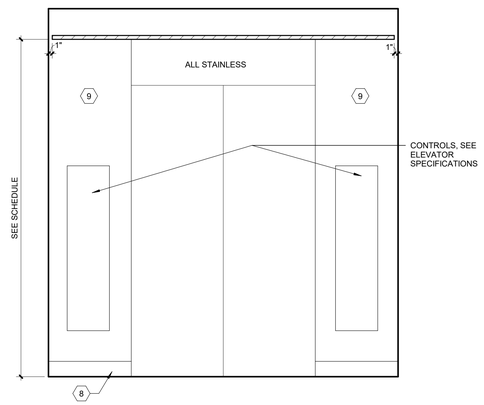


4 TYP FLOOR FINISH PLAN

Scale: 3/4" = 1'-0"

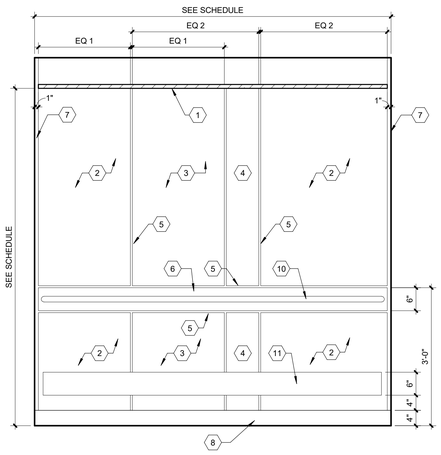
1 PASSENGER ELEVATOR CAB INTERIOR AXON

Scale: 1/4" = 1'-0"



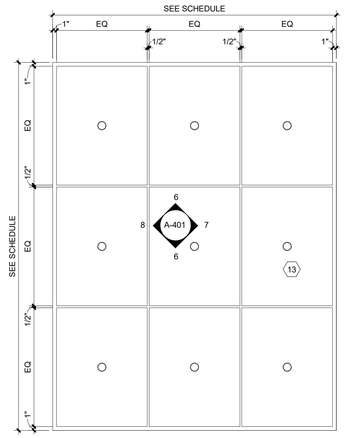
8 CAB FRONT INTERIOR ELEVATION

Scale: 3/4" = 1'-0"



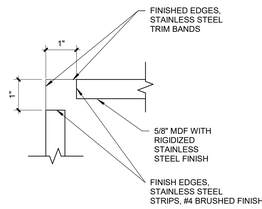
7 CAB REAR INTERIOR ELEVATION

Scale: 3/4" = 1'-0"



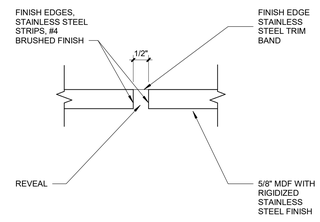
5 REFLECTED CEILING PLAN

Scale: 3/4" = 1'-0"



2 DETAIL - CORNER

Scale: 6" = 1'-0"



3 DETAIL - REVEAL

Scale: 6" = 1'-0"

SHEET NOTES:

A. CONTRACTOR TO PROTECT WORK TO REMAIN FROM DAMAGE DURING DEMOLITION.

B. ALL CONSTRUCTION DEBRIS IS TO BE REMOVED FROM SITE EACH DAY AND DISPOSED OF PROPERLY PER CONTRACT REQUIREMENTS.

C. CONTRACTOR TO PROVIDE PROTECTIVE BARRIERS, WARNING SIGNS AND TEMPORARY PATHWAYS IN AREAS THAT WILL BE OPERATING DURING THE CONSTRUCTION PHASE.

D. PROVIDE DUST AND DEBRIS BARRIER IN ACCORDANCE WITH ICRA REQUIREMENT.

E. CONTRACTOR TO PATCH ANY WORK TO REMAIN THAT WAS DAMAGED DURING DEMOLITION TO MATCH EXISTING REMAINING.

F. CONTRACTOR TO ENSURE TO NOT DAMAGE RATED SHAFT WALLS OR FIRE / SMOKE RATED PARTITIONS. ANY RATED WALLS DAMAGED DURING CONSTRUCTION ARE TO BE REPAIRED PER RATED PARTITION REQUIREMENTS.

G. VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY THE COR OF ANY CONFLICTS PRIOR TO PROCEEDING WITH DEMOLITION.

H. REFER TO MECHANICAL, ELECTRICAL, AND COMMUNICATION DOCUMENTS FOR RESPECTIVE DEMOLITION AND NEW WORK INFORMATION.

I. SPRINKLER HEADS TO BE TURNED UP DURING CONSTRUCTION WHERE CEILINGS HAVE BEEN REMOVED.

J. USE OF TEMPORARY ICRA BARRIERS, I.E. STARC WALL, TO BE USED IN ALL ELEVATOR LOBBIES. MUST USE 1-HOUR RATED WALL FOR ICRA BARRIERS.

(##) KEY NOTES:

1 BASIS OF DESIGN: FORMS + SURFACES SS CEILING PANEL W/ MIST FINISH, WITH 6 LED DOWNLIGHTS AND LED PERIMETER LIGHTING OR APPROVED EQUAL

2 BASIS OF DESIGN: FORMS + SURFACES STAINLESS STEEL PANEL WITH DIAMOND FINISH OR APPROVED EQUAL

3 BASIS OF DESIGN: FORMS + SURFACES FUSED BRONZE PANEL WITH MIRROR FINISH AND REEDS ECO ETCH PATTERN OR APPROVED EQUAL

4 BASIS OF DESIGN: FORMS + SURFACES FUSED BRONZE PANEL WITH SEASTONE FINISH AND CARBON FUSION PATTERN OR APPROVED EQUAL

5 1/2" ALUMINUM PANEL FRAME WITH CLEAR ANODIZED FINISH OR APPROVED EQUAL

6 BASIS OF DESIGN: FORMS + SURFACES STAINLESS STEEL PANEL WITH SEASTONE FINISH OR APPROVED EQUAL

7 1.14" ALUMINUM CORNER REVEAL WITH CLEAR ANODIZED FINISH OR APPROVED EQUAL

8 BASIS OF DESIGN: FORMS + SURFACES 4" HIGH STAINLESS STEEL TOEKICK WITH SEASTONE FINISH OR APPROVED EQUAL

9 NEW STAINLESS FRONT OF CAB, 14 GAUGE STAINLESS STEEL #4 BRUSHED FINISH OR APPROVED EQUAL - SEE ELEVATOR SPECIFICATIONS

10 1 1/2" DIAMETER ROUND STAINLESS STEEL HANDRAIL WITH ENDS TURNED BACK TOWARD THE WALL OR APPROVED EQUAL

11

12 BASIS OF DESIGN: MONDO SPORT IMPACT 6MM RUBBER FLOORING, COLOR: OU18 DARK GREY

13 MAKE THIS WHOLE PANEL AN ACCESS PANEL.

KEY PLAN

SCALE: NO SCALE

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: TYPICAL PASSENGER ELEVATOR PLANS, ELEVATIONS, DETAILS AND FINISHES

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number A-401

Dwg 5 of 6

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VA FORM 08-6231

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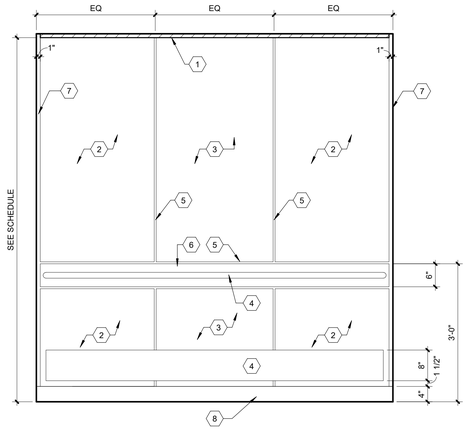
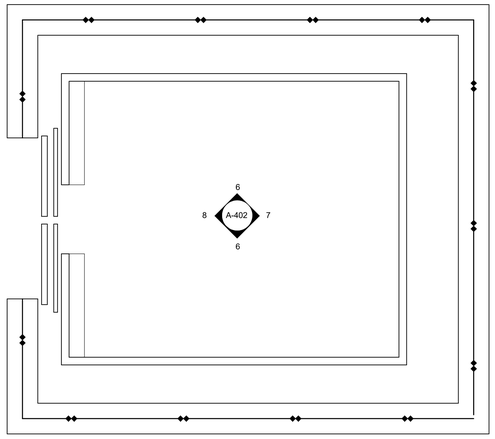
SERVICE ELEVATOR CAB SIZE SCHEDULE				
BUILDING	ELEVATOR	WIDTH	DEPTH	CEILING HEIGHT
41	S-1	76"	90"	94"
41	S-2	76"	90"	94"
41	S-3	76"	90"	108"
41	S-4	76"	90"	108"
41	S-5	84"	60"	86"
41	T-4	40"	60"	

NOTE: SEE SPECIFICATION SECTION 14 12 11 FOR DUMBWAITER CAB FINISHES AND HOISTWAY ENTRANCES.

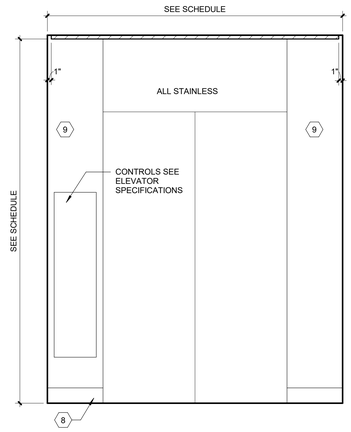


6 CAB SIDE INTERIOR ELEVATION
Scale: 3/4" = 1'-0"

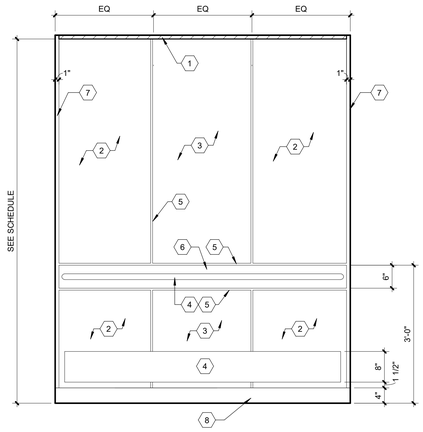


4 TYP FLOOR FINISH PLAN
Scale: 3/4" = 1'-0"

1 SERVICE ELEVATOR CAB INTERIOR AXON
Scale: 1/4" = 1'-0"



8 CAB FRONT INTERIOR ELEVATION
Scale: 3/4" = 1'-0"



7 CAB REAR INTERIOR ELEVATION
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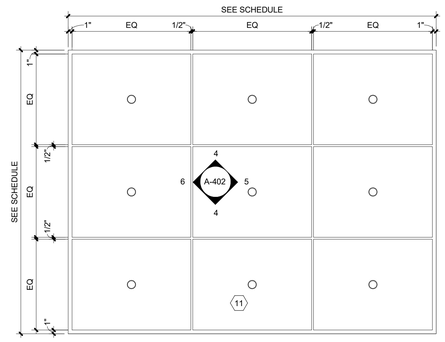

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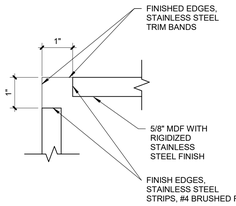
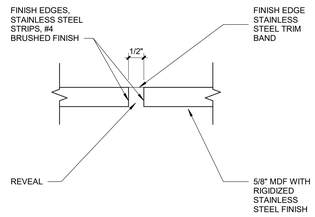


2 DETAIL - CORNER
Scale: 6" = 1'-0"



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2 BASIS OF DESIGN: FORMS + SURFACES STAINLESS STEEL PANEL WITH DIAMOND FINISH OR APPROVED EQUAL

3 BASIS OF DESIGN: FORMS + SURFACES STAINLESS STEEL PANEL WITH SEASTONE FINISH AND REEDS ECO ETCH PATTERN OR APPROVED EQUAL

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5 1/2" ALUMINUM PANEL FRAME WITH CLEAR ANODIZED FINISH OR APPROVED EQUAL

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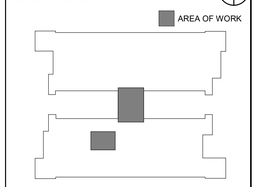
9 NEW STAINLESS FRONT OF CAB, 14 GAUGE STAINLESS STEEL #4 BRUSHED FINISH OR APPROVED EQUAL - SEE ELEVATOR SPECIFICATIONS

10 NEW PLYWOOD 3/4" SUBFLOOR AND BASIS OF DESIGN: MONDO SPORT IMPACT 6MM RUBBER FLOORING, COLOR: OU18 DARK GREY

KEY PLAN
SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION
2 HR - FIRE SEPARATION
SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

STATE OF OHIO
WALTER DAVID VANSCOTER
ARC.1716954
REGISTERED ARCHITECT
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: TYPICAL SERVICE ELEVATOR PLANS, ELEVATIONS, AND FINISHES

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: WVS | Drawn: EJD

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number A-402

Dwg 6 of 6

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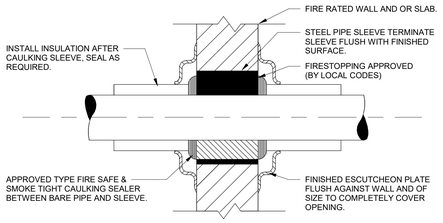
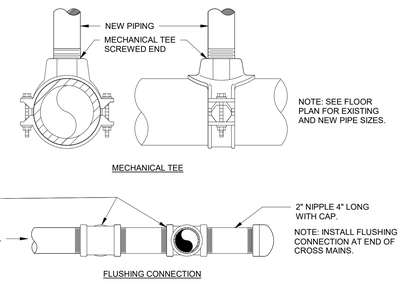


NOTE: MINIMUM SIZE OF OPENINGS AROUND SPRINKLER PIPE PENETRATIONS OF CONCRETE OR CMU WALLS SHALL BE IN ACCORDANCE WITH NFPA 13 SEISMIC REQUIREMENTS.

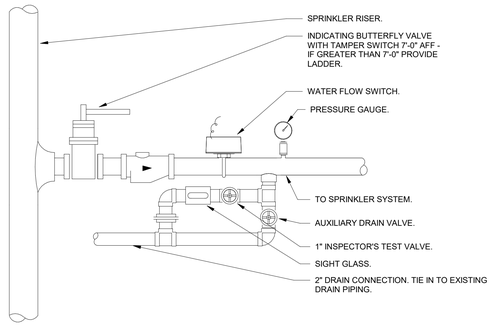
4 SPRINKLER PIPE SLEEVE THRU FIRE RATED WALL

Scale: N.T.S.



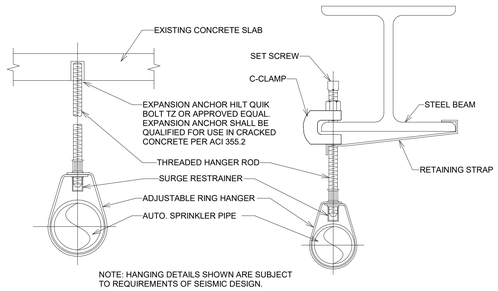
1 MECHANICAL TEE AND FLUSHING CONNECTION DETAIL

Scale: N.T.S.



5 TYPICAL FLOOR CONTROL VALVE ASSEMBLY DETAIL

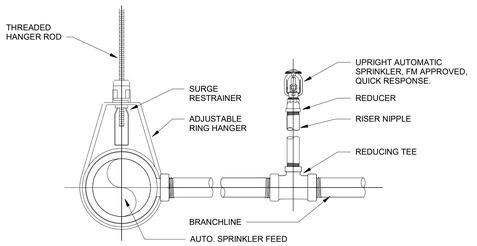
Scale: N.T.S.



NOTE: HANGING DETAILS SHOWN ARE SUBJECT TO REQUIREMENTS OF SEISMIC DESIGN.

2 PIPE HANGER SUPPORT DETAIL

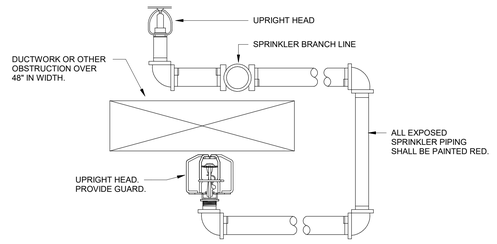
Scale: N.T.S.



NOTE:
1. ALL EXPOSED PIPING SHALL BE PAINTED RED.
2. PROVIDE GUARDS ON UPRIGHT SPRINKLERS UNLESS OTHERWISE NOTED.

6 TYPICAL UPRIGHT AUTOMATIC SPRINKLER

Scale: N.T.S.



NOTES:
1. SPRINKLER CONTRACTOR SHALL PROVIDE SPRINKLER ABOVE AND BELOW DUCT OR OTHER OBSTRUCTION OVER 48" IN WIDTH.
2. SPRINKLER CONTRACTOR SHALL COORDINATE WITH THE HVAC AND GENERAL CONTRACTOR.
3. SPRINKLER CONTRACTOR SHALL INCLUDE COST OF ADDITIONAL SUPPORTS, AS REQUIRED. ADDITIONAL SUPPORTS SHALL BE IN FULL CONFORMANCE WITH NFPA REQUIREMENTS. ADDITIONAL SUPPORTS SHALL NOT BE HUNG FROM DUCT WORK.

3 SPRINKLER ABOVE AND BELOW DUCT DETAIL

Scale: N.T.S.

FIRE SUPPRESSION SYMBOLS AND ABBREVIATIONS

NOTE: NOT ALL SYMBOLS MAY BE USED ON THIS PROJECT

—FL—	FIRE LINE	FPC	FIRE PROTECTION CONTRACTOR
○	UPRIGHT SPRINKLER HEAD		EXTERIOR ALARM GONG (WATER ACTIVATED)
⊛	SEMI-RECESSED SPRINKLER HEAD		BACKFLOW PREVENTER
⊙	CONCEALED SPRINKLER HEAD		CHECK VALVE
●	PENDANT SPRINKLER HEAD		GATE VALVE
◀	SIDEWALL SPRINKLER HEAD	T&D	TEST AND DRAIN ASSEMBLY
	ORDINARY HAZARD GROUP 1 OCCUPANCY	TS	TAMPER SWITCH
	ORDINARY HAZARD GROUP 2 OCCUPANCY	FS	FLOW SWITCH
	KEYNOTE		FIRE DEPARTMENT CONNECTION (FDC)
## / #	DETAIL MODULE NUMBER / DETAIL OR SECTION MARK SHOWN ON DRAWING		POINT OF NEW CONNECTION
			POINT OF TERMINATION/CAP

INFECTION CONTROL MEASURES

A. CONTRACTOR SHALL COMPLY WITH THE VA'S INFECTION CONTROL RISK ASSESSMENT REQUIREMENTS AND WRITTEN DUST CONTROL PLAN.

B. EXISTING AIR QUALITY REQUIREMENTS AND OTHER UTILITY REQUIREMENTS FOR OCCUPIED AREAS SHALL BE MAINTAINED.

C. RENOVATION AREAS SHALL BE ISOLATED FROM OCCUPIED AREAS DURING CONSTRUCTION USING AIRTIGHT BARRIERS. PROVIDE EXHAUST AIRFLOW IN A MANNER THAT SHALL BE SUFFICIENT TO MAINTAIN NEGATIVE AIR PRESSURE IN THE CONSTRUCTION ZONE. COORDINATE TEMPORARY BARRIERS WITH INTERIM LIFE SAFETY MEASURES.

D. FIRE PROTECTION SYSTEM REVISIONS SHALL BE PROPERLY PERFORMED TO LIMIT WATERBORNE OPPORTUNISTIC PATHOGENS.

E. CRUCIAL VENTILATION SPECIFICATIONS FOR AIR BALANCE AND FILTRATION SHALL BE VERIFIED BEFORE OWNER'S ACCEPTANCE.

BUILDING AND OCCUPANT SAFETY - INTERRUPTION OF FIRE PROTECTION SERVICE

A. DURING THE TIME THAT THE FIRE PROTECTION RENOVATION WORK IS BEING PERFORMED, AND THE FIRE PROTECTION SYSTEM IS DOWN AND OUT OF COMMISSION, THE FIRE PROTECTION CONTRACTOR SHALL HAVE SUFFICIENT PERSONNEL ONSITE TO KEEP A "FIRE WATCH" ON THE FACILITY PER VA REQUIREMENTS.

B. A FIRE PROTECTION WATCH IS IMPLEMENTED TO ENSURE THE FIRE SAFETY OF A BUILDING IN THE EVENT OF ANY ACT, OR SITUATION INSTIGATING AN INCREASED RISK TO PERSONS OR PROPERTY. THE TERM "FIRE WATCH" IS USED TO DESCRIBE A DEDICATED PERSON OR PERSONS WHO'S SOLE RESPONSIBILITY IS TO LOOK FOR FIRES WITHIN AN ESTABLISHED AREA.

C. IN THE OPINION OF THE FIRE AND LIFE-SAFETY GROUP (FLS) OF FACTORY MUTUAL (FM), ANY REQUIRED FIRE PROTECTION SYSTEM THAT IS OUT OF SERVICE FOR MORE THAN 4 HOURS AND OCCUPIED IS REQUIRED TO ESTABLISH A FIRE WATCH. FOR THE PERSON OR PERSONS ASSIGNED TO THE FIRE WATCH, THIS MUST BE THEIR ONLY JOB DUTY DURING THE TIME PERIOD OF THE FIRE PROTECTION RENOVATION WORK.

D. IN ADDITION THE BUILDING OWNER IS REQUIRED TO HAVE AN IMPAIRMENT COORDINATOR. THE OUT OF SERVICE EQUIPMENT MUST BE TAGGED "OUT OF SERVICE". AN OUT OF SERVICE TAG MUST BE PLACED AT THE FIRE ALARM PANEL AND THE FIRE DEPARTMENT CONNECTION (REFERENCE INTERNATIONAL FIRE CODE- CHAPTER 9, SECTION 901.7).

E. FIRE WATCH PERSONNEL ARE TO KEEP WATCH FOR FIRES IN THE GENERAL AREA OF PERFORMANCE, THE PERSONS PERFORMING THE FIRE WATCH ARE NOT PERMITTED TO PERFORM ANY OTHER DUTIES.

F. FIRE WATCH PERSONNEL ARE TO HAVE FIRE EXTINGUISHING EQUIPMENT READILY AVAILABLE AND TO BE TRAINED IN ITS USE.

G. THE QUANTITY OF PERSONNEL INVOLVED IN THE FIRE WATCH IS TO BE ADEQUATE SUCH THAT EACH FLOOR, LEVEL, AND ROOM OF THE FIRE AREA IS COVERED.

H. IN GENERAL, A FIRE WATCH IS TO FULFILL THE INTENT OF NFPA-72 AS FOLLOWS: 1. NOTIFY OCCUPANTS TO EVACUATE WHEN THERE IS A FIRE IN THE BUILDING; 2. NOTIFY THE CENTRAL MONITORING STATION TO INITIATE EMERGENCY PERSONNEL RESPONSE; 3. ACTIVATE FIRE PROTECTION SYSTEMS IN ORDER TO RELEASE DOOR HOLDERS, CLOSE SMOKE DAMPERS, AND SHUT DOWN FANS.

FIRE SUPPRESSION DEMOLITION GENERAL NOTES

A. LOCATIONS SHOWN FOR EXISTING FIRE PROTECTION PIPE AND EQUIPMENT ARE APPROXIMATE. THE CONTRACTOR IS TO FIELD VERIFY THE EXACT LOCATIONS OF EXISTING FIRE PROTECTION LINES AND EQUIPMENT INCLUDING RISERS AND VALVES PRIOR TO THE START OF WORK.

B. COORDINATE WITH VA FOR ANY SHUTDOWNS OR PLANNED INTERRUPTIONS OF THE FIRE PROTECTION SERVICE. THE CONTRACTOR SHALL GIVE THE VA THREE (3) DAYS NOTICE PRIOR TO THE PLANNED SHUTDOWN OR INTERRUPTION.

C. COORDINATE DEMOLITION OF FIRE PROTECTION PIPING WITH OTHER PIPING WHICH IS NOT TO BE REMOVED. PROTECT OTHER PIPING WHICH IS NOT TO BE REMOVED FROM DAMAGE, DIRT, AND DEBRIS.

D. ALL FIRE PROTECTION RELATED EQUIPMENT AND PIPING WHICH IS REMOVED FROM THE BUILDING IS TO BE TAKEN OFFSITE AND DISPOSED OF.

FIRE SUPPRESSION GENERAL NOTES

A. THE FIRE PROTECTION CONTRACTOR SHOULD USE NFPA-13 (CURRENT EDITION), CHAPTER 8, "PLANS AND CALCULATIONS" AS A GUIDELINE WHEN PREPARING SUBMITTALS FOR REVIEW. DISREGARD ONLY THOSE ITEMS NOT APPLICABLE TO THE INDIVIDUAL BUILDING SYSTEM. FIRE PROTECTION MATERIALS, EQUIPMENT AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA-13 FOR THE INSTALLATION OF AUTOMATIC SPRINKLER SYSTEM.

B. THE FIRE PROTECTION CONTRACTOR SHALL COMPLY WITH THE INTERNATIONAL BUILDING CODE (LATEST ADOPTED EDITION). INSTALLATION SHALL MEET THE REQUIREMENTS OF THE VA.

C. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS AND ROOM FINISH SCHEDULE WHICH INDICATE CEILING HEIGHTS. COORDINATE WITH ARCHITECT'S REFLECTED CEILING PLAN FOR PROPOSED LOCATION OF SPRINKLER HEADS IN AREAS WITH CEILINGS. LOCATE HEADS IN AREAS WITHOUT CEILINGS AS REQUIRED BY NFPA AND VA REQUIREMENTS FOR THE APPROPRIATE HAZARD CLASSIFICATION.

D. THIS FACILITY IS A TOTALLY SPRINKLERED BUILDING. FIRE SUPPRESSION SHALL BE TO MODIFY THE EXISTING WET PIPE TYPE SYSTEM WITH COMPLETE SPRINKLER PROTECTION UNLESS NOTED OTHERWISE. SYSTEM TO BE DESIGNED AS REQUIRED BY NFPA AND VA REQUIREMENTS FOR THE APPROPRIATE HAZARD CLASSIFICATION.

E. SPRINKLER HEAD LAYOUTS INDICATED ARE BASED ON OCCUPANCY HAZARD CLASSIFICATIONS OUTLINED IN NFPA-13 AND VA STANDARDS.

F. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HYDRAULICALLY CALCULATE SPRINKLER REQUIREMENTS PER THE APPROPRIATE HAZARD OCCUPANCY AND PROVIDE ACTUAL NUMBER OF HEADS, REQUIRED SPACING AND PIPE ROUTING AS REQUIRED FOR CLEARANCE WITH STRUCTURAL CONDITIONS AND OTHER TRADES TO PROVIDE A COMPLETE AND OPERABLE SYSTEM IN ACCORDANCE WITH NFPA AND VA REQUIREMENTS.

G. FIRE PROTECTION CONTRACTOR SHALL OBTAIN PUMP FLOW TEST DATA INDICATING THE WATER FLOW AND PRESSURE AVAILABLE TO THE FACILITY AND MAKE ARRANGEMENTS TO HAVE A FLOW TEST PERFORMED. FIRE PROTECTION CONTRACTOR TO INCLUDE IN THEIR BID, ALL COSTS ASSOCIATED WITH PUMP FLOW TEST. SUBMIT HYDRAULIC CALCULATIONS AND PLANS RELATED TO A MINIMUM OF 1 REMOTE AREA FOR REVIEW.

H. PIPING IS SHOWN IN SCHEMATIC FORM TO INDICATE APPROXIMATE ARRANGEMENT OF EQUIPMENT AND PIPING. SPRINKLER CONTRACTOR SHALL DESIGN THE SYSTEM AND ROUTE PIPING AS REQUIRED FOR CONFORMANCE WITH ACTUAL BUILDING CONDITIONS AND NFPA REQUIREMENTS. COORDINATE SPRINKLER WORK WITH ALL OTHER TRADES TO AVOID CONFLICT.

I. REFER TO SPECIFICATION SECTIONS IN DIVISION 21 FOR ADDITIONAL INFORMATION PERTAINING TO THE FIRE PROTECTION SYSTEM.

J. SUPPORT ALL NEW PIPING AND EQUIPMENT FROM STRUCTURE ABOVE AS REQUIRED. CONTRACTOR SHALL PROVIDE ALL SUPPLEMENTAL STEEL TO SPAN BETWEEN PRIMARY BUILDING STRUCTURAL MEMBERS. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETE DESIGN OF SUPPLEMENTAL STEEL AND SUPPORTS INCLUDING REACTION LOADS AT PRIMARY BUILDING STRUCTURAL MEMBERS.

K. PROVIDE SPRINKLER HEADS IN CONCEALED LOCATIONS PER NFPA REQUIREMENTS.

L. DURING CONSTRUCTION PROCEDURES, THE ENTIRE WORK AREA SHALL BE CLEAN OF ALL DUST, DIRT, AND OTHER DEBRIS BEFORE APPLICATION OF ANY NEW MATERIALS.

M. THESE DRAWINGS INDICATE THE GENERAL EXTENT OF THE WORK AND ARE NOT INTENDED TO SHOW OR DESCRIBE ALL WORK REQUIRED FOR THE FULL PERFORMANCE AND COMPLETION OF CONTRACT DOCUMENTS.

N. PROVIDE ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, ETC. REQUIRED FOR COMPLETE AND FUNCTIONAL SYSTEM AS SPECIFIED AND INDICATED ON THE DRAWINGS.

O. INCLUDE IN BID PERMIT, INSPECTION, AND OTHER FEES REQUIRED BY LOCAL MUNICIPALITY OR VA REQUIRED FOR COMPLETION OF WORK SO NO ADDITIONAL EXPENSES ARE INTRODUCED TO VA.

P. PROMPTLY INFORM THE VA, IN WRITING, OF ANY DEVIATIONS IN THE CONTRACT DOCUMENTS FROM REQUIREMENTS OF LOCAL LAWS AND REGULATIONS. PERFORM WORK IN ACCORDANCE WITH SUCH REQUIREMENTS AT NO ADDITIONAL COST TO THE VA.

Q. FIRE PROTECTION CONTRACTOR SHALL SUBMIT ONE COMPLETE SET OF AUTOMATIC SPRINKLER SYSTEM DRAWINGS, HYDRAULIC CALCULATIONS, CURRENT WATER FLOW TEST, AND THE EQUIPMENT DATA BROCHURES PREPARED BY OR UNDER THE SUPERVISION OF, AND SEALED BY A PROFESSIONAL ENGINEER. THE SUBMITTAL SHALL BE SENT TO THE VA FOR REVIEW AND APPROVAL. SYSTEM SHALL ALSO BE IN COMPLIANCE WITH ALL REQUIRED PLUMBING CODES.

R. ALL EXPENSES CARRIED BY THE A/E IN TROUBLESHOOTING SYSTEM(S) PROBLEMS CAUSED BY INADEQUATE WORKMANSHIP, LACK OF TECHNICAL EXPERTISE OR OTHER FORMS OF POOR PERFORMANCE ON THE PART OF A CONTRACTOR, SHALL BE BORN BY THAT CONTRACTOR.

S. PROVIDE FIRE STOPS / SEALANT AT ALL PIPE PENETRATIONS THROUGHOUT FIRE RATED WALLS. REVIEW ARCHITECTURAL PLANS PRIOR TO BIDDING AND INDICATE PENETRATIONS ON SPRINKLER LAYOUT SUBMITTAL.

T. ELECTRONIC FLOW AND TAMPER SWITCHES ARE EXISTING TO REMAIN AS IS.

U. WATER SERVICE, DETECTOR TYPE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER , AND FIRE PUMP ARE EXISTING TO REMAIN AS IS.

V. FIRE PROTECTION CONTRACTOR SHALL FURNISH AND INSTALL ARMOVER SUPPORTS FOR ALL END OF LINE BRANCH LINES PER NFPA-13, SECTION: 9.2.3.4. REFER TO A.9.2.3.4.3(B) FOR ACCEPTABLE.

W. ALL DROPS TO SPRINKLER HEADS SHALL TEE / ELBOW OFF TOP OF BRANCH PIPE, EXCEPT WHERE STRUCTURAL, ARCHITECTURAL OR MECHANICAL EQUIPMENT CONDITIONS PRECLUDE CONVENTIONAL INSTALLATION.

X. SPRINKLER HEADS SHALL BE IN A SYMMETRICAL PATTERN, NOT NECESSARILY IN THE CENTER OF ROOMS, CORRIDORS OR CEILING TILE.

Y. THE FIRE PROTECTION CONTRACTOR SHALL LOCATE THE INSPECTOR'S TEST CONNECTION AND MAIN DRAIN LOCATIONS IN ACCORDANCE WITH NFPA-13.

THE FIRE PROTECTION DRAWING IS DESIGNED TO BE IN CONFORMANCE WITH NFPA 13. IT IS A PERFORMANCE BASED DRAWING INDICATING THE EXTENT OF FIRE PROTECTION WORK FOR THE AREA THAT THIS DRAWING REPRESENTS. THIS DRAWING IS "FOR INFORMATION ONLY", AS A REFERENCE FOR THE FIRE PROTECTION CONTRACTOR TO BASE THE DESIGN OF THE FIRE PROTECTION SYSTEM ON. THE CONTRACTOR SHALL VERIFY THE EXACT CONDITIONS THAT THIS DRAWING REPRESENTS, INCLUDING ANY PERCEIVED CONCEALED SPACES, AND THE BUILDING TYPE AND CONSTRUCTION AS OUTLINED IN THE INTERNATIONAL BUILDING CODE, PRIOR TO THE START OF WORK. REFER TO THE INTERNATIONAL BUILDING CODE, ESPECIALLY CHAPTERS 6 (TYPES OF CONSTRUCTION) AND CHAPTER 9 (FIRE PROTECTION SYSTEMS), NFPA 13 (CHAPTER 8), AND THE PROJECT SPECIFICATIONS FOR OTHER FIRE PROTECTION REQUIREMENTS.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED Robert Arnold 57882 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: FIRE PROTECTION GENERAL INFORMATION

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date	Checked	Drawn
JANUARY 27, 2023	RHA	RHA

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number FX001

Dwg 1 of 3

1/24/2023 5:56:56 AM

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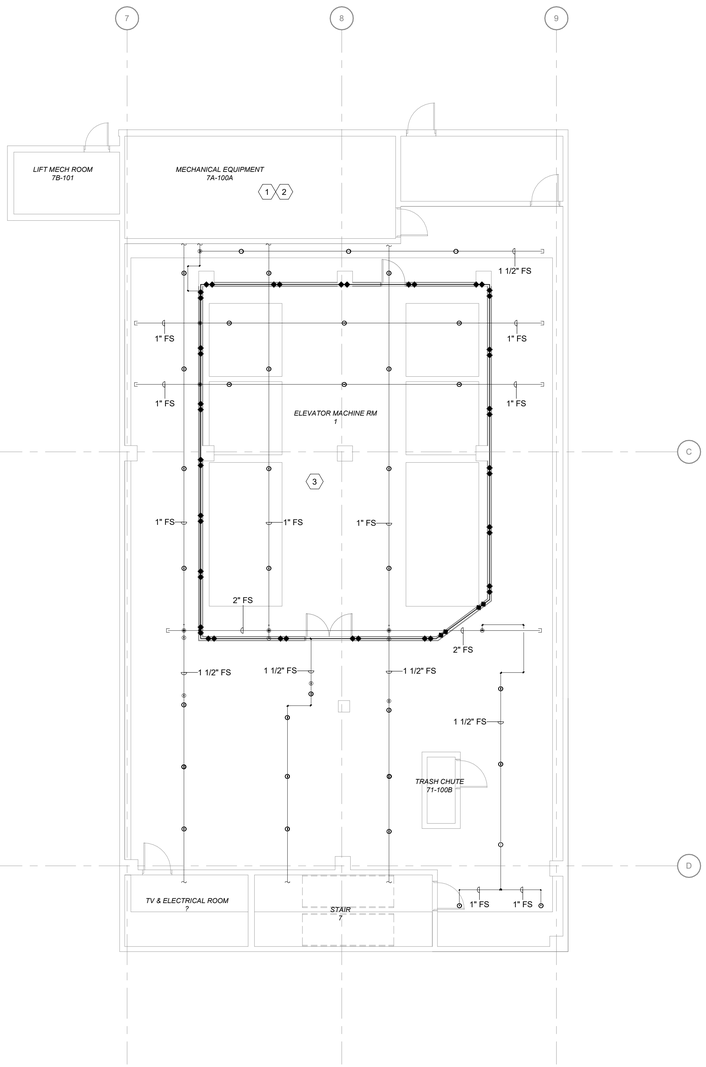
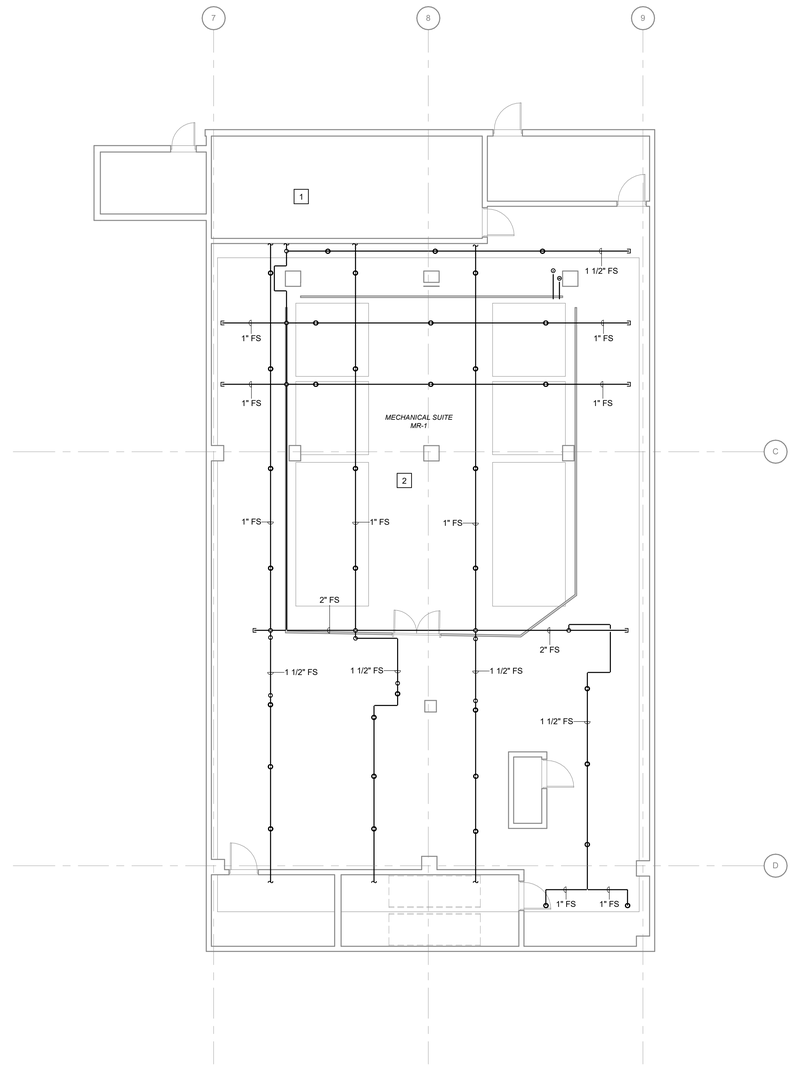


2 Penthouse - Fire Protection Plan

Scale: 1/8" = 1'-0"

0 4 8 16 TRUE NORTH



1 Penthouse - Fire Protection Demolition Plan

Scale: 1/8" = 1'-0"

0 4 8 16 TRUE NORTH

SHEET NOTES:

A. FIRE PROTECTION CONTRACTOR TO FIELD-VERIFY LOCATION OF FIRE SUPPRESSION PIPING & SPRINKLER HEADS.
B. SPRINKLER LAYOUT IS FOR REFERENCE ONLY. CONTRACTOR TO ROUTE PIPING PER SITE CONDITIONS AND LOCATE SPRINKLER HEADS PER NFPA-13 (2019).
C. CONTRACTOR SHALL PROVIDE HYDRAULIC CALCULATIONS WITH PIPING LAYOUT AND SIZING.
D. CONTRACTOR TO PERFORM FLOW TEST DATA TO THE AFFECTED ZONE(S)

KEY NOTES:

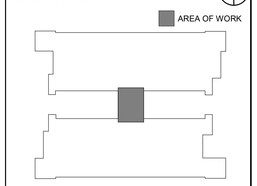
1 CONTRACTOR TO DEMOLISH EXISTING FIRE SUPPRESSION PIPING & SPRINKLER HEADS, AS REQUIRED, TO ACCOMMODATE THE NEW 2-HR FIRE PARTITION.
2 NO DEMOLITION WORK IS REQUIRED WITHIN THE ELEVATOR SHAFTS, ASSOCIATED WITH THE FIRE PROTECTION SYSTEM (TYP.)

KEY NOTES:

1 CONTRACTOR TO INSTALL NEW FIRE SUPPRESSION PIPING, AS REQUIRED, TO ACCOMMODATE MODIFICATIONS TO THE PENTHOUSE MACHINE ROOM.
2 CONTRACTOR TO INSTALL (N) QUICK RESPONSE SPRINKLER HEADS. OCCUPANCY CLASSIFICATION IS ORDINARY HAZARD GROUP 1.
3 NO NEW WORK IS REQUIRED WITHIN THE ELEVATOR SHAFTS, ASSOCIATED WITH THE FIRE PROTECTION SYSTEM (TYP.)

KEY PLAN

SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION
2 HR - FIRE SEPARATION
SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED ROBERT H. ANDERSON 37882 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 PENTHOUSE FIRE PROTECTION PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number FX101

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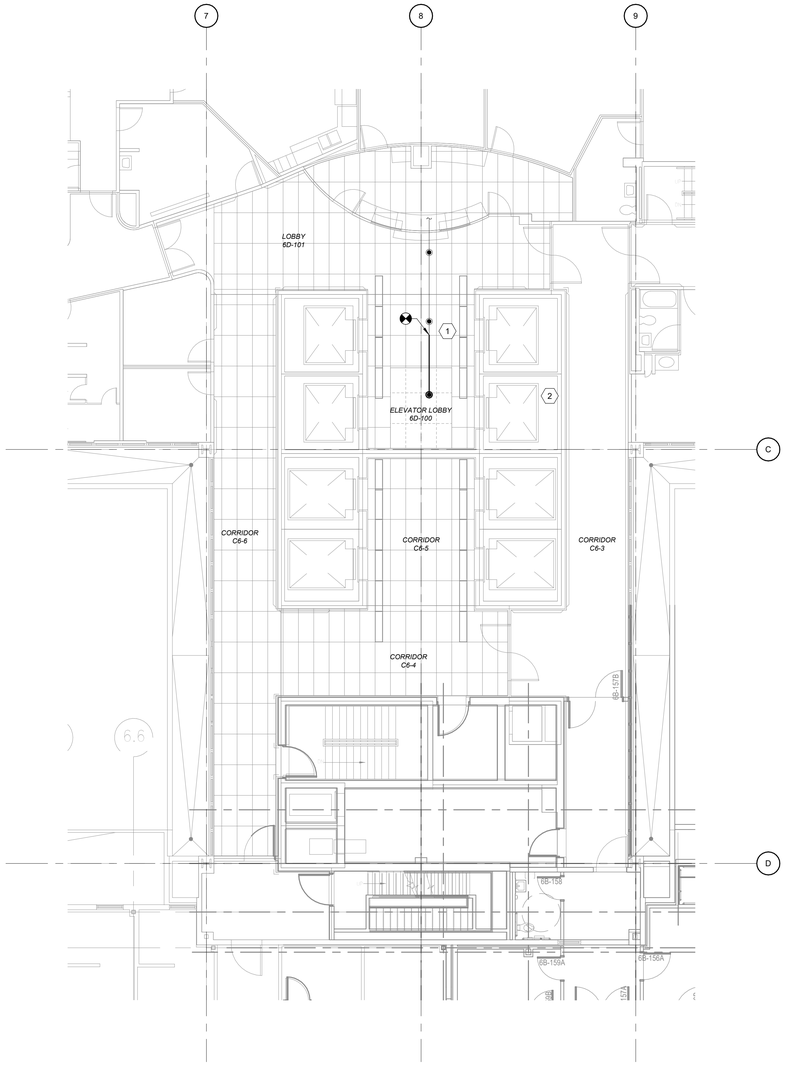
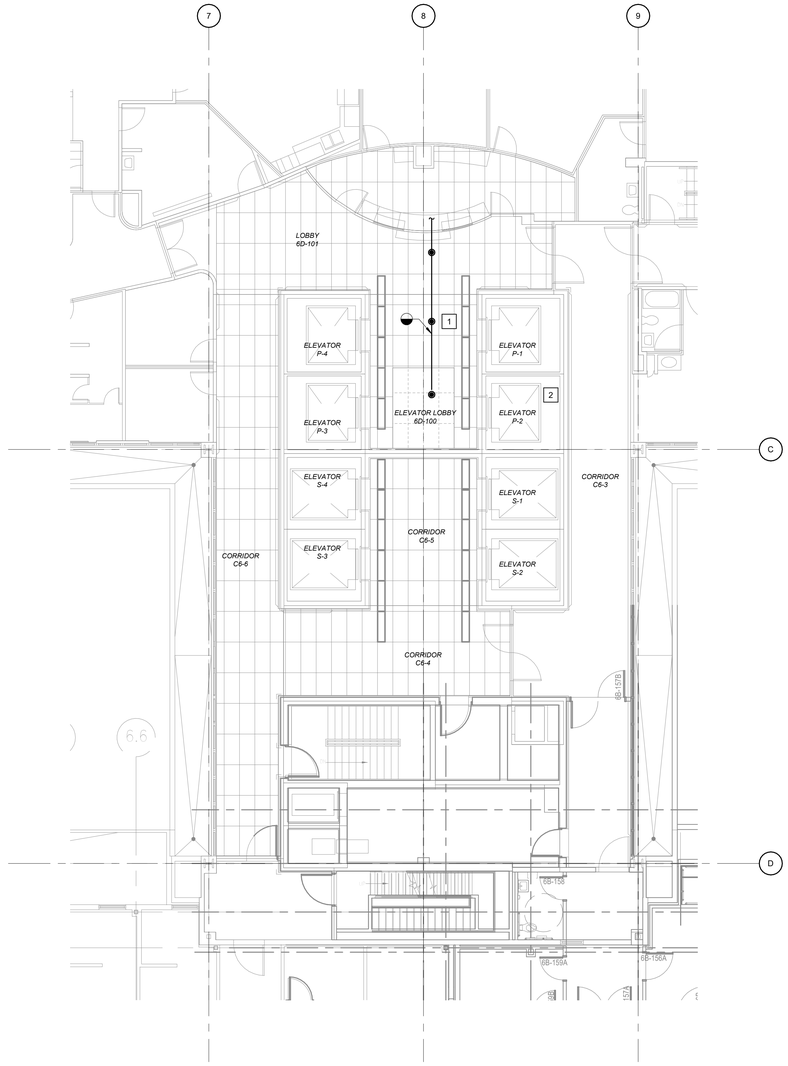


2 6th Floor - Fire Protection Plan
Scale: 1/8" = 1'-0"



1 6th Floor - Fire Protection Demolition Plan
Scale: 1/8" = 1'-0"

SHEET NOTES:

A. FIRE PROTECTION CONTRACTOR TO FIELD-VERIFY LOCATION OF FIRE SUPPRESSION PIPING & SPRINKLER HEADS.
B. SPRINKLER LAYOUT IS FOR REFERENCE ONLY. CONTRACTOR TO ROUTE PIPING PER SITE CONDITIONS AND LOCATE SPRINKLER HEADS PER NFPA-13 (2019).
C. CONTRACTOR SHALL PROVIDE HYDRAULIC CALCULATIONS WITH PIPING LAYOUT AND SIZING.
D. CONTRACTOR TO PERFORM FLOW TEST DATA TO THE AFFECTED ZONE(S)

KEY NOTES:

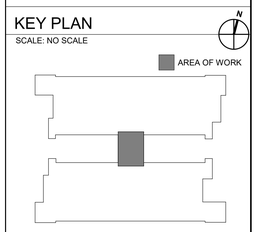
1 CONTRACTOR TO DECOMMISSION EXISTING SPRINKLER HEAD AND DEMOLISH EXISTING FIRE PROTECTION PIPING & CAP. PROVIDE TEMPORARY FIRE GUARD OR MEANS OF FIRE SUPPRESSION DURING PERIOD OF CONSTRUCTION IN THIS AREA.
2 NO DEMOLITION WORK IS REQUIRED WITHIN THE ELEVATOR SHAFTS, ASSOCIATED WITH THE FIRE PROTECTION SYSTEM (TYP.)

KEY NOTES:

1 CONTRACTOR TO INSTALL NEW LIGHT HAZARD OCCUPANCY SPRINKLER HEAD AND CONNECT TO EXISTING FIRE SUPPRESSION PIPING.
2 NO NEW WORK IS REQUIRED WITHIN THE ELEVATOR SHAFTS, ASSOCIATED WITH THE FIRE PROTECTION SYSTEM (TYP.)

KEY PLAN

SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION
2 HR - FIRE SEPARATION
SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED ROBERT R. ANDERSON 37882 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 6TH FLOOR FIRE PROTECTION PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number FX102

Dwg 3 of 3

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PLUMBING ABBREVIATIONS

ANNOTATION ABBREVIATIONS

A/E	ARCHITECT/ENGINEER	G	GALLON	PA	PASCAL
AC	ABOVE CEILING	GC	GENERAL CONTRACTOR	PC	PLUMBING CONTRACTOR
AD	AREA DRAIN	GCO	GRADE CLEANOUTS	PD	PRESSURE DROP
AFF	ABOVE FINISHED FLOOR	GD	GARBAGE DISPOSAL	PDI	PLUMBING AND DRAINAGE INSTITUTE
AG	AIR GAP	GPD	GALLONS PER DAY	PG	PRESSURE GAUGE
AP	ACCESS PANEL	GPH	GALLONS PER HOUR	PP	PLUMBING PUMP
AS	AUTOMATIC SPRINKLER	GPM	GALLONS PER MINUTE	PPM	PARTS PER MILLION
AFG	ABOVE FINISHED GRADE	GPR	GAS PRESSURE REGULATOR	PRS	PRESSURE REDUCING STATION
ASD	ADJUSTABLE SPEED DRIVE	GRS	GAS REGULATOR STATION	PRV	PRESSURE REDUCING VALVE
ASHRAE	AMERICAN SOCIETY HEATING, REFRIGERATING, AIR CONDITIONING ENGINEERS	GT	GREASE TRAP	PSI	POUNDS PER SQUARE INCH
		GVTR	GAS VENT THROUGH ROOF	PSIA	POUNDS PER SQUARE INCH ATMOSPHERE
		GWH	GAS FIRED WATER HEATER		
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS			PSIG	POUNDS PER SQUARE INCH GAUGE
		H&CW	HOT AND COLD WATER	PTRV	PRESSURE TEMPERATURE RELIEF
ASPE	AMERICAN SOCIETY PLUMBING ENGINEERS	HB	HOSE BIBB (INTERIOR)		VALVE
		HD	HUB DRAIN	PW	POTABLE WATER
ASR	AUTOMATIC SPRINKLER RISER	HEX	HEAT EXCHANGER		
AV	ACID VENT	HP	HORSEPOWER	RD	ROOF DRAIN
AW	ACID WASTE	HS	HAND SINK	RDL	ROOF DRAIN LEADER
		HST	HOT WATER STORAGE TANK (DOMESTIC)	RL	ROOF LEADER
				RO	REVERSE OSMOSIS
BAS	BUILDING AUTOMATION SYSTEM	HWB	HOT WATER BOILER	RWL	RAIN WATER LEADER
BF	BELOW FLOOR	HWCP	HOT WATER CIRCULATING PUMP		
BFP	BACKFLOW PREVENTER	HWP	HOT WATER PUMP	SAN	SANITARY SEWER
BG	BELOW GRADE	HYD	HYDRANT	SCFM	STANDARD CUBIC FOOT/MIN
BH	BOOSTER HEATER			SCW	SOFTENED COLD WATER
BHP	BREAK HORSEPOWER			SDMH	STORM DRAIN MANHOLE
BJ	BETWEEN JOISTS	ICW	INDUSTRIAL COLD WATER	SP	SUMP PUMP
BOP	BOTTOM OF PIPE	INV	INVERT	SPR	SPRINKLER LINE
BSP	BLACK STEEL PIPE	IPC	INTERNATIONAL PLUMBING CODE	SQFT	SQUARE FOOT
BT	BATHTUB	IRW	IRRIGATION WATER	SS	STAINLESS STEEL
BTUH	BRITISH THERMAL UNITS PER HOUR	IW	INDIRECT WASTE	ST	STORAGE TANK
		IWH	INSTANTANEOUS WATER HEATER	SW	STORM WATER
C	CELSIUS	IWR	INDUSTRIAL WATER RETURN		
CF	COMBINATION FIXTURE	IWS	INDUSTRIAL WATER SUPPLY	TCV	TEMPERATURE CONTROL VALVE
CGA	COMPRESSED GAS ASSOCIATION			TD	TRENCH DRAIN
CI	CAST IRON	KW	KILOWATT	TDH	TOTAL DYNAMIC HEAD
CO	CLEANOUT	KWHR	KILOWATT-HOUR	TDL	TEMPERATURE DIFFERENTIAL
COND	CONDENSATE			TEMP	TEMPERATURE
CP	CONDENSATE PUMP	L/S	LITER PER SECOND	TMV	THERMOSTATIC MIXING VALVE
CS	CLINICAL SINK	LA	LABORATORY AIR	TP	TRAP PRIMER
CV	CONTROL VALVE	LAV	LAVATORY	TSTAT	THERMOSTAT
		LBS/HR	POUNDS PER HOUR	TWR	TEMPERED WATER RETURN
DCW	DOMESTIC COLD WATER	LCW	LABORATORY COLD WATER	TWS	TEMPERED WATER SUPPLY
DHW	DOMESTIC HOT WATER	LHW	LABORATORY HOT WATER	TYP	TYPICAL
DHWR	DOMESTIC HOT WATER RETURN	LNG	LIQUID NATURAL GAS		
DHWS	DOMESTIC HOT WATER SUPPLY	LOX	LIQUID OXYGEN		
DF	DRINKING FOUNTAIN	LV	LABORATORY VACUUM	UPC	UNIFORM PLUMBING CODE
DI	DEIONIZED WATER	LW	LOW WATER		
DN	DOWN			V	SANITARY VENT
DOE	DEPARTMENT OF ENERGY	M	METER	VAC	VACUUM
DS	DOWNSPOUT	MA	MEDICAL AIR	VB	VACUUM BREAKER
DW	DISHWASHER	MAV	MANUAL AIR VENT	VCO	VACUUM CLEANER OUTLET
DWG	DRAWING	MBH	THOUSANDS OF BTU PER HOUR	VP	VACUUM PUMP
DWH	DOMESTIC WATER HEATER	MC	MECHANICAL CONTRACTOR	VS	VENT STACK
DWR	DRINKING WATER RETURN	MED	MEDICAL	VTR	VENT THROUGH ROOF
DWS	DRINKING WATER SUPPLY	MER	MECHANICAL EQUIPMENT ROOM		
DWV	DRAIN WASTE VENT	MH	MANHOLE	W	WASTE
		MOU	MEMORANDUM OF UNDERSTANDING	WC	WATER CLOSET
EC	ELECTRICAL CONTRACTOR	MSB	MOP SINK BASIN	WCO	WALL CLEANOUT
EL	ELEVATION	MV	MEDICAL VACUUM	WG	WATER GAUGE
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM			WH	WATER HEATER
		N2	NITROGEN	WHA	WATER HAMMER ARRESTOR
EPA	ENVIRONMENTAL PROTECTION AGENCY	N2O	NITROUS OXIDE	WHD	WALL HYDRANT
		NC	NORMALLY CLOSED	WL	WATER LINE
EPACT	ENERGY POLICY ACT	NG	NATURAL GAS	WM	WATER METER
ESC	ESCUTCHEON	NIC	NOT IN CONTRACT	WPD	WATER PRESSURE DROP
ESH	EMERGENCY SHOWER	NO	NORMALLY OPEN	WS	WASTE STACK
ET	EXPANSION TANK	NOM	NOMINAL		
EWC	ELECTRIC WATER COOLER	NPW	NON POTABLE WATER	YCO	YARD CLEANOUT
EWH	ELECTRIC WATER HEATER	NTS	NOT TO SCALE	YH	YARD HYDRANT
EWS	EYEWASH STATION				
EX	EXISTING	O2	OXYGEN		
		OC	ON CENTER		
F	FAHRENHEIT	OD	OUTSIDE DIAMETER		
FA	FROM ABOVE	OFD	OVERFLOW DRAIN		
FB	FROM BELOW	OR	OPERATING ROOM		
FBO	FURNISHED BY OTHERS	OVFL	OVERFLOW		
FCO	FLOOR CLEANOUT				
FCW	FILTERED COLD WATER				
FD	FLOOR DRAIN				
FDC	FIRE DEPARTMENT (HOSE) CONNECTION				
FM	FLOW METER				
FOP	FUEL OIL PUMP				
FOR	FUEL OIL RETURN				
FOS	FUEL OIL SUPPLY				
FOV	FUEL OIL VENT				
FS	FLOOR SINK				
FU	FIXTURE UNITS				

PLUMBING SYMBOLS

	PIPE SLOPE ARROW
	FLOW ARROW
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	3-WAY CONTROL VALVE
	ANGLE GATE VALVE
	ANGLE GLOBE VALVE
	BALANCING/SHUTOFF VALVE
	BALL VALVE
	BUTTERFLY VALVE
	CALIBRATED BALANCING VALVE
	CHECK VALVE
	CIRCUIT SETTER VALVE
	CONTROL VALVE
	EXPANSION VALVE
	GAS COCK
	GATE VALVE
	GLOBE VALVE
	PLUG VALVE
	PRESSURE REDUCING VALVE (WATER)
	PRESSURE REGULATOR (GAS)
	QUICK OPEN VALVE
	SAFETY RELIEF VALVE
	SOLENOID VALVE
	VACUUM RELIEF VALVE
	BACKFLOW PREVENTER
	HOSE BIBB / SILLCOCK
	AUTOMATIC AIR VENT
	PRESSURE GAUGE
	THERMOMETER
F	FLOW SWITCH
P	PRESSURE SWITCH
T	TEMPERATURE SWITCH
	PIPE UNION
	WYE STRAINER
	WYE STRAINER W/DRAIN VALVE
	PUMP
OR	FLOOR DRAIN - ROUND OR SQUARE
OR	FLOOR CLEANOUT - ROUND OR SQUARE
CO	SUSPENDED CLEANOUT
WCO	WALL CLEANOUT
	PIPE CAP
	PIPE TURNING DOWN
	PIPE TURNING UP
	TEE UP
	TEE DOWN
	DROP AND RUN
	DROP AND TURN
	TEE OFF TOP
	TEE OFF BOTTOM
	CROSS AND RISER
	PLAN 90° ELBOW
	PIPE TEE
	FLEXIBLE PIPE CONNECTOR
	PIPE ANCHOR
	PIPE GUIDES
M	WATER METER

PLUMBING SYMBOLS

	PIPING SYSTEM	
—AW—	AW	ACID WASTE
—CA—	CA	COMPRESSED AIR
—CD—	CD	CONDENSATE DRAIN
—CO2—	CO2	CARBON DIOXIDE
—NG—	NG	NATURAL GAS
—GW—	GW	GREASE WASTE
—MA—	MA	MEDICAL AIR
—N2—	N2	NITROGEN
—N2O—	N2O	NITROUS OXIDE
—OFD—	OFD	OVERFLOW STORM DRAIN
—OW—	OW	OIL WASTE
—O2—	O2	OXYGEN
—PD—	PD	PUMP DISCHARGE
—PG—	PG	PROPANE GAS
—ST—	ST	STORM
—VAC—	VAC	VACUUM
—WAGD—	WAGD	WASTE ANESTHETIC GAS DISPOSAL
—SAN—	SAN	SANITARY WASTE
—AV—	AV	ACID VENT
—OV—	OV	OIL VENT
—V—	V	SANITARY VENT
— - —	CW	DOMESTIC COLD WATER
—DI—	DI	DE-IONIZED WATER
—NPCW—	NPCW	NONPOTABLE COLD WATER
—RO—	RO	REVERSE OSMOSIS WATER
—SCW—	SCW	SOFTENED COLD WATER
— - — - —	HW	DOMESTIC HOT WATER
—HW 140—	HW 140	DOMESTIC HOT WATER (OTHER TEMP)
— - — - —	CWR	DOMESTIC CW RECIRCULATION
— - — - —	HWR	DOMESTIC HW RECIRCULATION

ANNOTATION SYMBOLS

#	NEW KEYNOTE
#	DEMO KEYNOTE
NEW	BOLD TEXT INDICATES NEW ITEM
(E)XISTING	TEXT INDICATES EXISTING ITEM
## / #	DETAIL MODULE NUMBER DETAIL OR SECTION MARK SHOWN ON DRAWING
	CONNECT TO EXISTING
	LIMITS OF DEMOLITION
P-###	PLUMBING EQUIPMENT DESIGNATION

PLUMBING DEMOLITION GENERAL NOTES

1. VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY COR REGARDING CONFLICTS BEFORE PROCEEDING WITH WORK.
2. REMOVED ITEMS REMAIN PROPERTY OF GOVERNMENT UNTIL COR DETERMINES THAT THEY ARE NOT REQUIRED. REMOVE FROM SITE ITEMS NOT BEING RETAINED BY GOVERNMENT OR REINSTALLED AS PART OF THIS WORK.
3. DO NOT DISTURB ITEMS NOT INDICATED FOR DEMOLITION.
4. VERIFY SIZE AND LOCATION OF EXISTING UTILITIES PRIOR TO START OF DEMOLITION. RELOCATE, REMOVE AND ADJUST MECHANICAL AND ELECTRICAL ITEMS AS NECESSARY TO COORDINATE WITH NEW WORK.
5. AFTER DEMOLITION IS COMPLETE, PATCH AND REPAIR FINISHES TO MATCH EXISTING ADJACENT CONDITIONS.
6. COORDINATE DEMOLITION WITH COR. SUBMIT SHUTDOWN PLAN AND SCHEDULE TO COR FOR REVIEW AND APPROVAL.
7. PROTECT EXISTING UTILITIES TO REMAIN FROM DAMAGE DURING DEMOLITION. REPAIR UTILITIES AND SERVICES DAMAGED AT NO ADDITIONAL COST.
8. TEMPORARILY MOVE OR TAKE EQUIPMENT OUT OF SERVICE AS NECESSARY TO COMPLETE WORK.
9. SAWCUT CONCRETE FLOOR AS REQUIRED FOR DEMOLITION WORK INDICATED. COORDINATE WITH NEW PLUMBING AND WORK OF OTHER TRADES.

PLUMBING GENERAL NOTES

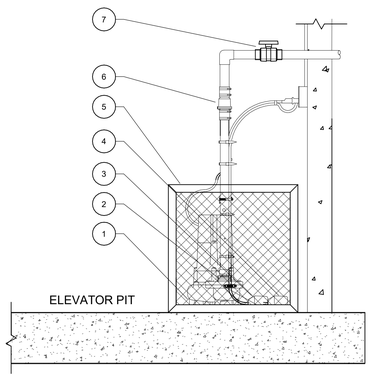
1. WORK SHALL CONFORM TO APPLICABLE LOCAL, STATE, AND NATIONAL CODES AND APPLICABLE VA STANDARDS.
2. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS.
3. OBTAIN AND PAY FOR PERMITS, FEES, AND INSPECTIONS REQUIRED FOR THIS WORK.
4. PROVIDE NEW MATERIALS, EQUIPMENT AND PRODUCTS INCORPORATED IN THE WORK, OF A SUITABLE GRADE FOR THE PURPOSES INTENDED.
5. EQUIPMENT OR MATERIAL DEVIATIONS FROM INDICATED CONTRACT REQUIREMENTS ARE SUBJECT TO THE APPROVAL OF THE COR. SUBMIT PROPOSED EQUIPMENT DEVIATIONS THAT ARE SIMILAR BOTH IN QUALITY AND CAPACITY TO THAT EQUIPMENT SPECIFIED, AS SOLELY DETERMINED BY THE COR.
6. INSTALL EQUIPMENT AS INDICATED, ALLOWING FOR SUFFICIENT ACCESS AND CLEARANCE SPACE FOR EQUIPMENT MAINTENANCE, REPAIRS, AND REPLACEMENT.
7. AT EACH PLUMBING FIXTURE, PROVIDE A PISTON TYPE WATER HAMMER ARRESTOR SIZED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
8. SANITARY DRAINAGE PIPING INDICATED IS LOCATED BELOW FLOOR SLAB OR WITHIN WALLS UNLESS NOTED OTHERWISE. SANITARY VENT PIPING INDICATED IS ABOVE THE CEILING OR WITHIN WALLS UNLESS NOTED OTHERWISE.
9. SUPPORT PIPING SYSTEM AS REQUIRED BY APPLICABLE LOCAL, STATE, AND NATIONAL CODES ALONG WITH SPECIFICATIONS, VA STANDARDS AND MANUFACTURER'S RECOMMENDATIONS.
10. FIRESTOP AND SEAL PIPING PENETRATIONS THROUGH WALLS AND FLOORS EQUAL TO THE RATING OF WALLS AND FLOORS.
11. TEST PLUMBING SYSTEM IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND NATIONAL CODES AND APPLICABLE VA STANDARDS.
12. COORDINATE PLUMBING PIPING WITH WORK OF OTHER DISCIPLINES.
13. DISINFECT DOMESTIC WATER SYSTEM IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND NATIONAL CODES AND APPLICABLE VA STANDARDS.
14. PROVIDE SHUT OFF VALVES AT BRANCH PIPING TO FIXTURES.
15. COORDINATE PLUMBING WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION. COORDINATE ROUTING OF PIPING WITH EXISTING CONDITIONS.
16. PROVIDE ALL NECESSARY OFFSETS, TEES, ELBOWS, ETC. FOR A COMPLETE AND COORDINATED WORKING PLUMBING SYSTEM. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS.
17. CONTRACTOR SHALL COORDINATE ANY PLUMBING SYSTEM REQUIRED SHUTDOWN WITH THE COR, 1 WEEK IN ADVANCE.
18. PATCH, PAINT AND CLEAN SURFACES SUSTAINING DAMAGE ASSOCIATED WITH PLUMBING WORK OF THIS CONTRACT, UNLESS NOTED OTHERWISE.
19. SUBMIT BOUND SET OF OPERATING AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT AT COMPLETION OF PROJECT.
20. INSTALL ESCUTCHEONS IN ALL PLACES WHERE PIPING PENETRATES A WALL IN AN EXPOSED LOCATION.
21. DO NOT INSTALL PIPES ABOVE TELECOM OR ELECTRICAL EQUIPMENT.

SUMP PUMP SCHEDULE

MARK	MANUFACTURER ()	MODEL	QUANTITY	LOCATION	TYPE	FLUID	FLOW	HEAD	MAX. TEMP.	HP	PHASE	VOLTAGE	SPEED CONTROL	REMARKS
SP-X	ZOELLER	188	4	BLDG 41 ELEVATOR SUMP PIT	SIMPLEX	WATER	145 GPM	137 FT	130 °F	2	3	200-575	NO	INSTALL NEW PUMPS WITH SIMPLEX CONTROL PANEL; LIMIT SWITCHES INCLUDE OFF, ON, & HIGH LEVEL ALARM

CONSTRUCTION NOTES

1. SUMP PUMP TO BE MOUNTED AND SECURED TO THE PIT FLOOR.
2. "PUMP OFF" INTEGRAL SWITCH TO BE MOUNTED AS LOW AS POSSIBLE TO DE-ENERGIZE THE PUMP PRIOR TO WATER DEPTH DROPPING BELOW THE PUMP SUCTION.
3. "PUMP ON" INTEGRAL SWITCH TO BE MOUNTED ABOVE THE "PUMP OFF" SWITCH, WHEN THE WATER LEVEL IS SAFE FOR THE PUMP TO OPERATE.
4. "HIGH-LEVEL ALARM" SWITCH TO BE MOUNTED ABOVE THE "PUMP ON" SWITCH, TO ALERT MAINTENANCE PERSONNEL OF WATER INFILTRATION.
5. ALUMINUM ANGLE & EXPANDED METAL CAGE TO BE MOUNTED OVER TOP OF SUMP PUMP AND SECURED TO PIT FLOOR.
6. INSTALL CHECK VALVE BETWEEN THE PUMP DISCHARGE AND THE ISOLATION GATE VALVE.
7. 3" ISOLATION VALVE AND DISCHARGE PIPING.
8. INTEGRATE (3) INTEGRAL SWITCHES WITH MANUFACTURER'S SIMPLEX CONTROL PANEL. FIELD COORDINATE EXACT LOCATION WITH COR.
9. SEE ELECTRICAL DWGS. FOR CONNECTION DETAILS, PANEL LOCATIONS, AND REQUIREMENTS.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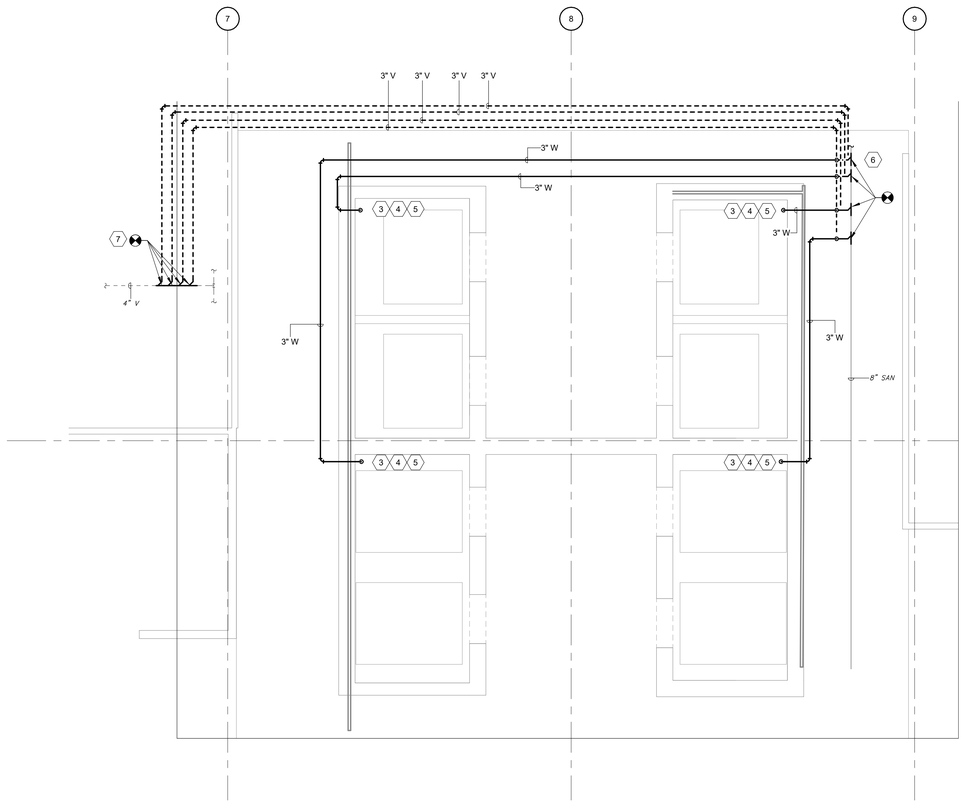
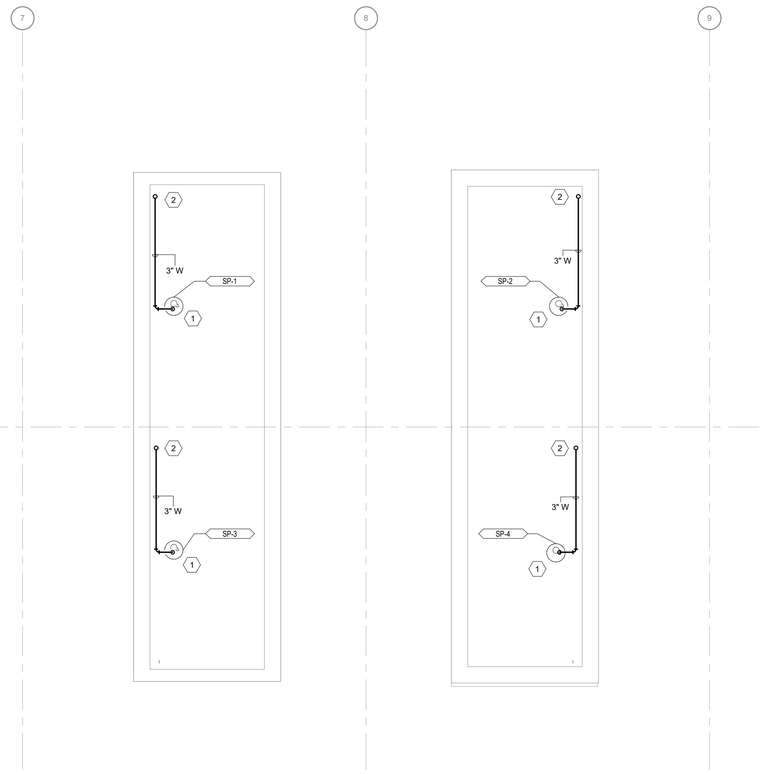


2 1ST FLOOR INTERSTITIAL PARTIAL WASTE & VENT PLAN

Scale: 1 : 60

0 5 10 20 TRUE NORTH



1 ELEVATOR PIT SUMP PUMP PARTIAL WASTE & VENT PLAN

Scale: 1 : 60

0 5 10 20 TRUE NORTH

SHEET NOTES:

A. REFERENCE M-100 FOR PARTIAL BASEMENT PLAN, FROM WHICH THE PARTIAL PLAN, THIS SHEET, IS DEVELOPED.

KEY NOTES:

1 INSTALL (N) SUMP PUMP, PROTECTIVE CAGE, SIMPLEX CONTROL PANEL, AND INTEGRATED FLOAT SWITCHES PER DETAIL 2, SHEET P-001.

2 3" SUMP PUMP DISCHARGE PIPING UP TO 1ST FLOOR INTERSTITIAL. REFERENCE INTERSTITIAL VIEW, THIS SHEET, FOR CONTINUATION.

3 3" SUMP PUMP DISCHARGE PIPING DOWN TO SUMP PIT BELOW. REFERENCE BASEMENT LEVEL VIEW, THIS SHEET, FOR CONTINUATION.

4 PROVIDE 16" DEPTH CORE THROUGH ELEVATOR SHAFT WALL TO ACCOMMODATE DISCHARGE PIPING. PROVIDE APPROPRIATE FIRE-STOP & SEAL AT PENETRATION.

5 ROUTE NEW SUMP PUMP DISCHARGE PIPING AS HIGH AS POSSIBLE AGAINST THE INTERSTITIAL OVERHEAD DECKING UNTIL DROPPING DOWN INTO THE INDIRECT TRAP ARM CONNECTION. MAINTAIN ADEQUATE EGRESS AND MAINTENANCE CLEARANCES IN THIS AREA OF WORK.

6 PROVIDE INDIRECT SANITARY CONNECTION BETWEEN SUMP PUMP DISCHARGE PIPING & EXISTING 8" SANITARY PIPING PER DETAIL 1, SHEET P-001. (TYP. 4)

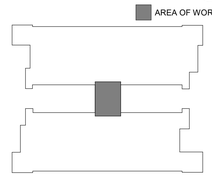
7 ROUTE NEW 3" VENT PIPING TO MAINTAIN ADEQUATE EGRESS & MAINTENANCE CLEARANCE IN THIS AREA OF WORK. PROVIDE (4) NEW VENT CONNECTIONS INTO THE EXISTING 4" VENT, AS SHOWN.

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK



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#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED ROBERT H. ARMSTRONG 37852 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ENLARGED PLUMBING PLANS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number P-401

Dwg 2 of 2

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MECHANICAL ABBREVIATIONS

A/E	ARCHITECT / ENGINEER
AAHX	AIR TO AIR HEAT EXCHANGER
AB	AIR BLENDER
AAV	AUTOMATIC AIR VENT
ACC	AIR-COOLED CONDENSER
ACCH	AIR-COOLED CHILLER
ACCU	AIR-COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
ACD	AUTOMATIC CONTROL DAMPER, MODULATING
ACD-TP	AUTOMATIC CONTROL DAMPER,TWO POSITION
AD	ACCESS DOOR
AF	AFTER FILTER
AFCV	AIR FLOW CONTROL VALVE
AFF	ABOVE FINISHED FLOOR
AFMD	AIR FLOW MEASURING DEVICE
AFW	AIR FOIL WHEEL (FAN)
AHU	AIR-HANDLING UNIT
AMP	AMPERAGE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AW	AIR WASHER
AXF	AXIAL FLOW
B	BOILER
BD	BUTTERFLY DAMPER
BDD	BACKDRAFT DAMPER
BDR	BASE BOARD RADIATOR
BFP	BACKFLOW PREVENTER
BFT	BOILER PLANT FIRE TUBE
BHP	BRAKE HORSEPOWER
BHW	HOT WATER HEATING BOILER
BHX	BOILER BLOWDOWN HEAT EXCHANGER
BW	BACKWARD INCLINED WHEEL (FAN)
BSC	BIOLOGICAL SAFETY CABINETS
BT	BUFFER TANK
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CENTIGRADE (CELSIUS)
CC	COOLING COIL
CCD	COOLING COIL CONDENSATE DRAIN
CENT	CENTRIFUGAL
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CFT	CUBIC FEET
CFP	CHEMICAL FEED PUMP
CH	CHILLER
CHWP	CHILLED WATER PUMP
CHW	CHILLER WATER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CM	CARBON MONOXIDE
CM	CUBIC METER
CM/S	CUBIC METER PER SECOND
CO	CLEAN OUT
CO2	CARBON DIOXIDE
COMP	COMPRESSOR UNIT
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	COLD WATER (POTABLE)
CHWCC	CHILLED WATER COOLING COIL
D	DAMPER - AUTOMATIC
D-1	OUTDOOR AIR DAMPER
D-2	RETURN AIR DAMPER
D-3	RELIEF AIR DAMPER
D-4	ECONOMIZER OUTDOOR AIR DAMPER
dB	DECIBELS
Db	DRY-BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROLS
DEG	DEGREE
DF	DIFFUSER
DIA	DIAMETER
DIW	DEIONIZED WATER
DP	DEW POINT TEMPERATURE
DP	DIFFUSER PLATE
DPA	DIFFERENTIAL PRESSURE ASSEMBLY
DPS	DIFFERENTIAL PRESSURE SENSOR
DX	DIRECT EXPANSION
DXCC	DIRECT EXPANSION COOLING COIL
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ECC	ENGINEERING CONTROL CENTER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EGS	EMERGENCY GAS SHUTOFF
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EMD	END OF MAIN DRIP (STEAM)
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
F	FAHRENHEIT
F&T	FLOAT AND THERMOSTATIC
F/SDPR	COMBINATION FIRE SMOKE DAMPER
FA	FREE AREA
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT (4 PIPE)
FCW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FM	FLOW METER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBER REINFORCED POLYESTER
FS	FLOW SWITCH
FSTAT	FREEZESTAT
FT	FEET
FT-LB	FOOT-POUND
FTR	FIN TUBE RADIATION
FV	FACE VELOCITY
GA	GAUGE
GAL	GALLONS
GH	GRAVITY HOOD
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GS	GALVANIZED STEEL
H	HUMIDIFIER
H&CW	HOT & COLD WATER
HAC	HOUSEKEEPING AID CLOSET
HB	HOSE BIBB
HC	HEATING COIL
HD	HEAD
HD	HOOD
HHW	HEATING HOT WATER
HHWC	HEATING HOT WATER COIL
HHWP	HEATING HOT WATER PUMP
HHWR	HEATING HOT WATER RETURN
HHWS	HEATING HOT WATER SUPPLY
HOA	HAND/OFF/AUTOMATIC
HP	HEAT PUMP
HP	HORSEPOWER
HPDT	HIGH PRESSURE DRIP TRAP
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HR	HOUR
HRC	HEAT RECOVERY COIL
HRD	HEAT RECOVERY DEVICE
HRP	HYDRONIC RADIANT (CEILING) PANEL
HRW	HEAT RECOVERY WHEEL
HSTAT	HUMIDISTAT
HUM	HUMIDIFIER UNIT MOUNTED
HVU	HEATING AND VENTILATING UNIT
HW	HOT WATER
HWC	HOT WATER COIL
HWUH	HOT WATER UNIT HEATER
HX	HEAT EXCHANGER
Hz	HERTZ
I/O	INPUT/OUTPUT
IAQ	INDOOR AIR QUALITY
IBT	INVERTED BUCKET TRAP
ICF	IN-LINE CENTRIFUGAL FAN
ICU	INTENSIVE CARE UNIT
ID	INSIDE DIAMETER
IFB	INTEGRAL FACE AND BYPASS
IN	INCHES
IN HG	INCHES OF MERCURY
IN WC	INCH WATER COLUMN
IN WG	INCH WATER GAUGE
IN-LB	INCH-POUND
IPLV	INTEGRATED PART LOAD VALUE
IRH	INFRARED HEATER
IS	INSECT SCREEN
IV	INLET VANES
kg	KILOGRAM
kg/HR	KILOGRAM PER HOUR
kPa	KILOPASCAL
kW	KILOWATT
kWh	KILOWATT HOUR
L	LITER
L/s	LITERS PER SECOND
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FOOT (FEET)
LH	LATENT HEAT
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LPS	LOW PRESSURE SUPPLY (STEAM)
LSD	LINEAR SLOT DIFFUSER
LTCP	LOCAL TEMPERATURE CONTROL PANEL
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
M	METER, SI UNIT
M/s	METERS PER SECOND (OR METERS/SECOND)
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MIXING BOX
MBH	1000 BTUH
MCA	MINIMUM BRANCH CIRCUIT AMPACITY
MER	MECHANICAL EQUIPMENT ROOM
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE SUPPLY (STEAM)
MTD	MEAN TEMPERATURE DIFFERENCE
MVD	MANUAL VOLUME DAMPER
N	NEW
NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOAA	NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM	NOMINAL
NPLV	NON-STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
OD	OUTSIDE DIAMETER
OR	OPERATING ROOM
OSA	OUTSIDE SUPPLY AIR (CONDITIONED)
P	PUMP
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PF	PRE-FILTER
PG	PRESSURE GAGE
PHC	PREHEAT COIL
PHCP	PREHEAT COIL PUMP
PPM	PARTS PER MILLION
PRV	PRESSURE REGULATING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAGE
PSS	PRIMARY SECONDARY SYSTEM
PSV	PRESSURE SAFETY VALVE
R/E	RETURN OR EXHAUST
RA	RETURN AIR
RAT	RETURN AIR TEMPERATURE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RF	RETURN FAN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RL	REFRIGERANT LIQUID LINE
RLA	RUN LOAD AMPERE
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
SA	SUPPLY AIR
SAD	SOUND ATTENUATING DEVICE
SAT	SUPPLY AIR TEMPERATURE
SC	SHADING COEFFICIENT
SCFM	STANDARD CUBIC FEET PER MINUTE
SCR	SILICON CONTROLLED RECTIFIER
SD	SMOKE DETECTOR
SD	SUPPLY AIR DIFFUSER
SDPR	SMOKE DAMPER
SDR	SMOKE DAMPER (RETURN)
SDS	SMOKE DAMPER (SUPPLY)
SEN	SENSIBLE HEAT
SF	SUPPLY FAN
SH	STEAM HUMIDIFIER
SHC	STEAM HEATING COIL
SI	SQUARE INCHES
SP	STATIC PRESSURE
SP GR	SPECIFIC GRAVITY
SPD	SUPPLY PROCESS AND DISTRIBUTION
SPRV	STEAM PRESSURE REDUCING VALVE
SPS	STATIC PRESSURE SENSOR
SQ FT	SQUARE FOOT (FEET)
SR	SUPPLY AIR REGISTER
SS	STAINLESS STEEL
SSR	SOLID SEPARATOR
ST	STEAM TRAP
SV	STEAM SAFETY VALVE
SVS	STEAM VENT SILENCER
T & PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
TAB	TESTING, ADJUSTING, BALANCE
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISSOLVED SOLIDS
TP	TRAP
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TU	TERMINAL UNIT
UC	UNDER CUT
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
VSD	VARIABLE SPEED DRIVE
VUH	VERTICAL UNIT HEATER
W	WATTS
Wb	WET-BULB (TEMPERATURE)
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAGE
WPD	WATER SIDE PRESSURE DROP
XT	EXPANSION TANK
YR	YEAR

MECHANICAL LEGEND

CARBON DIOXIDE SENSOR
THERMOSTAT OR TEMPERATURE SENSOR
HUMIDISTAT OR HUMIDITY SENSOR
SUPPLY DIFFUSER
RETURN GRILLE
EXHAUST GRILLE
LINEAR SLOT DIFFUSER
DIFFUSER TAG | DIFFUSER CFM
EQUIPMENT TAG
BALANCING DAMPER (RECTANGULAR)
BALANCING DAMPER (ROUND)
FIRE DAMPER
SMOKE DAMPER
FIRE / SMOKE DAMPER
ROUND FLEX DUCT
INCLINED RISE, IN DIRECTION OF AIRFLOW
INCLINED DROP, IN DIRECTION OF AIRFLOW
CONNECT NEW DUCT TO EXISTING
LIMIT OF DEMOLITION

VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
VANED ELBOW (SHORT RADIUS)
STANDARD RADIUS ELBOW (LONG RADIUS)
NEW DUCT (INSIDE DIMENSIONS: WIDTH X DEPTH)
EXISTING DUCT TO REMAIN
EXISTING DUCT TO BE DEMOLISHED
DUCT TRANSITION
END MOUNTED OR SIDEWALL GRILLE
TERMINAL UNIT SUPPLY DUCT BRANCH (CONICAL TAP)
STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)
SUPPLY DUCT (UP & DOWN)
EXHAUST DUCT (UP & DOWN)
RETURN DUCT (UP & DOWN)

HIGH PRESSURE STEAM PIPING (60 PSI)
HIGH PRESSURE STEAM CONDENSATE RETURN
MEDIUM PRESSURE STEAM PIPING (16 PSI AND 59 PSI)
MEDIUM PRESSURE STEAM CONDENSATE RETURN
LOW PRESSURE STEAM PIPING (15 PSI AND BELOW)
LOW PRESSURE STEAM CONDENSATE RETURN
CHILLED WATER SUPPLY PIPING
CHILLED WATER RETURN PIPING
HEATING HOT WATER SUPPLY PIPING
HEATING HOT WATER RETURN PIPING
REFRIGERANT LINE SET (LIQUID AND SUCTION)
CONDENSATE DRAIN LINE
PIPE UP
PIPE DOWN
BOTTOM CONNECTION
TOP CONNECTION
CAPPED OR PLUGGED PIPE
CONNECT TO EXISTING PIPE
LIMITS OF DEMOLITION

GLOBE VALVE
GATE VALVE
BALL VALVE
CHECK VALVE
STEAM SAFETY VALVE
PRESSURE REGULATING VALVE
WYE STRAINER VALVE
BALANCING VALVE
MODULATING CONTROL VALVE
TWO POSITION CONTROL VALVE
STEAM TRAP
DRAIN VALVE
TEST PLUG
STEAM PRESSURE REDUCING VALVE
INLINE CENTRIFUGAL PUMP

MECHANICAL GENERAL NOTES

1. WORK SHALL CONFORM TO APPLICABLE LOCAL, STATE, AND NATIONAL CODES AND APPLICABLE VA STANDARDS.
2. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS.
3. OBTAIN AND PAY FOR PERMITS, FEES, AND INSPECTIONS REQUIRED FOR THIS WORK.
4. PROVIDE NEW MATERIALS, EQUIPMENT AND PRODUCTS INCORPORATED IN THE WORK, OF A SUITABLE GRADE FOR THE PURPOSES INTENDED.
5. WHERE POSSIBLE, PROVIDE STANDARD PRODUCTS OF THE VARIOUS MANUFACTURERS EXCEPT WHERE SPECIAL CONSTRUCTION OR PERFORMANCE FEATURES ARE REQUIRED.
6. EQUIPMENT OR MATERIAL DEVIATIONS FROM INDICATED CONTRACT REQUIREMENTS SHALL BE SUBJECT TO THE APPROVAL OF THE COR. SUBMIT PROPOSED EQUIPMENT DEVIATIONS THAT ARE SIMILAR BOTH IN QUALITY AND CAPACITY TO THAT EQUIPMENT SPECIFIED, AS SOLELY DETERMINED BY THE COR.
7. PROVIDE MECHANICAL EQUIPMENT THAT IS LISTED AND LABELED BY UNDERWRITERS LABORATORIES (U.L.).
8. INSTALL EQUIPMENT AS INDICATED, ALLOWING FOR SUFFICIENT ACCESS AND CLEARANCE SPACE FOR EQUIPMENT MAINTENANCE, REPAIRS, AND REPLACEMENT.
9. INSTALL EQUIPMENT WITH PROPER CLEARANCES FOR REQUIRED PIPING AND ELECTRICAL SERVICES AND CONNECTIONS. INSTALL EQUIPMENT WITH REQUIRED ACCESS AND CLEARANCES IN ACCORDANCE WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS AND APPLICABLE CODES AND STANDARDS.
10. COORDINATE LOCATION, INSTALLATION, AND ROUTING OF DUCTWORK, PIPING, AND EQUIPMENT WITH WORK OF ALL OTHER TRADES.
11. PROVIDE SUPPORT FOR MECHANICAL EQUIPMENT. COORDINATE SUPPORT LOCATIONS WITH ALL CONTRACTORS PRIOR TO INSTALLATION.
12. PROVIDE POWER CONNECTIONS TO EQUIPMENT PROVIDED UNDER THIS CONTRACT AS WORK OF DIVISION 26.
13. PROVIDE CONTROL WIRING FOR MECHANICAL EQUIPMENT AS WORK OF DIVISION 23.
14. DUCTWORK AND PIPING LAYOUTS AND LOCATIONS ARE SCHEMATIC. DO NOT SCALE THESE DRAWINGS. COORDINATE AND DETERMINE EXACT ROUTING OF DUCTWORK AND PIPING IN THE FIELD.
15. FIELD VERIFY DIMENSIONS BY ACTUAL MEASUREMENT AND OBSERVATION BEFORE ORDERING OR FABRICATING DUCTWORK, PIPING OR EQUIPMENT.
16. NOTIFY COR REGARDING DISCREPANCIES BETWEEN CONTRACT DOCUMENTS AND EXISTING CONDITIONS OR DIMENSIONS BEFORE PERFORMING WORK. FAILURE TO VERIFY AND REPORT SHALL CONSTITUTE CONTRACTOR'S ACCEPTANCE OF EXISTING CONDITIONS AS FIT FOR THE PROPER EXECUTION OF THE WORK.
17. SEE ARCHITECTURAL DRAWINGS FOR FINAL LOCATION OF CEILING INSTALLED EQUIPMENT.
18. INSTALL DUCTWORK AND PIPING AS HIGH AS POSSIBLE AND AS CLOSE AS POSSIBLE TO BUILDING WALLS, CEILING AND FLOOR AND ROOF STRUCTURE. PROVIDE OFFSETS, FITTINGS, AND DIMENSIONAL TRANSITIONS NOT SHOWN BUT REQUIRED TO MAINTAIN MINIMUM CLEAR SPACE TO BUILDING SURFACES AT NO ADDITIONAL COST.
19. PATCH, PAINT AND CLEAN SURFACES SUSTAINING DAMAGE ASSOCIATED WITH MECHANICAL WORK OF THIS CONTRACT, UNLESS NOTED OTHERWISE.
20. SUBMIT BOUND SET OF OPERATING AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT AT COMPLETION OF PROJECT.
21. INSTALL ESCUTCHEONS IN ALL PLACES WHERE PIPING PENETRATES A WALL IN AN EXPOSED LOCATION.
22. MAKE A COMPLETE REVIEW OF DRAWINGS, INCLUDING SCHEDULES AND DETAILS, PRIOR TO BEGINNING MECHANICAL SYSTEM INSTALLATION. RESOLVE CONFLICTS WITH COR.
23. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS.
24. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE NOT ACCEPTABLE UNLESS SPECIFICALLY INDICATED OTHERWISE.
25. INSTALL PIPING FREE OF SAGS AND BENDS.
26. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.
27. PIPING SHALL NOT BE ROUTED OVER TELECOM OR ELECTRICAL CLOSETS/ROOMS.
28. PREPARE DRAWINGS SHOWING MECHANICAL SYSTEMS AND EQUIPMENT FOR COORDINATION WITH WORK OF OTHER DIVISIONS AND WORK BY THE GOVERNMENT.
    A. INCLUDE PLAN VIEWS, SECTIONS, AND ELEVATIONS, AS REQUIRED, TO FULLY COORDINATE ALL NEW WORK WITH ITSELF AND EXISTING CONDITIONS.
    B. DRAWINGS SHALL SHOW, BUT NOT BE LIMITED TO, ALL DUCTWORK, AIR DISTRIBUTION, MECHANICAL EQUIPMENT, MECHANICAL PIPING, FIRE PROTECTION PIPING, PLUMBING PIPING, CABLE TRAYS, LIGHTING FIXTURES, CEILING GRID AND HEIGHT, BEAMS AND JOISTS (WITH ELEVATIONS MARKED), ELECTRICAL CONDUIT LARGER THAN 2 INCHES IN DIAMETER AND OTHER CEILING MOUNT DEVICES OR EQUIPMENT THAT PROTRUDE INTO THE CEILING CAVITY.
    C. IF THERE ARE OUTSTANDING ISSUES THAT CANNOT BE RESOLVED, CONSULT WITH COR FOR GUIDANCE AND MAKE CORRECTIONS IN ACCORDANCE WITH DIRECTIONS GIVEN.
    D. DO NOT BEGIN FABRICATION OR PLACE EQUIPMENT ORDERS UNTIL COORDINATION DRAWINGS HAVE BEEN APPROVED.
29. INSTALLATION COMMENCED PRIOR TO COORDINATION DRAWING APPROVAL IS TAKEN AT THE CONTRACTORS OWN RISK. MODIFY, MOVE OR RECONFIGURE WORK LACKING COORDINATION AT NO ADDITIONAL COST

SUPPLY AIR TERMINAL SCHEDULE

MARK	MANUFACTURER	MODEL	AREA SERVED	DIFFUSER WIDTH	DIFFUSER HEIGHT	AIRFLOW (CFM)	APD	DAMPER	NC
SD-1	TITUS	300R	PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	24"	16"	1968	0.13 in-wg	YES	34
SD-1	TITUS	300R	PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	24"	16"	1968	0.13 in-wg	YES	34
SD-1	TITUS	300R	PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	24"	16"	1968	0.13 in-wg	YES	34
SD-2	PRICE	520	T-4 ELEVATOR MACHINE ROOM	8"	6"	210	0.17 in-wg	YES	25

RETURN AIR TERMINAL SCHEDULE

MARK	MANUFACTURER	MODEL	AREA SERVED	DIFFUSER WIDTH	DIFFUSER HEIGHT	AIRFLOW (CFM)	APD	DAMPER	NC
RG-1	TITUS	300R	PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	44"	44"	0	0.04 in-wg	NO	20
RG-1	TITUS	300R	PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	44"	44"	0	0.04 in-wg	NO	20
RG-2	PRICE	530	T-4 ELEVATOR MACHINE ROOM	12"	8"	0	0.04 in-wg	NO	20

AIR HANDLING AND CONDENSING UNIT SCHEDULE

MARK	LOCATION	AREA AND/OR ROOM SERVED	AIRFLOW		COOLING CAPACITY	REF. TYPE	MOTOR			
			SUPPLY	RETURN			MOTOR HP	VOLTAGE	PHASE	MOTOR FLA
AHU-2	PENTHOUSE MECHANICAL ROOM	SOUTH ELECTRCAL ROOM	1600 CFM	1600 CFM	48,000 Btu/h	R-410A	0.75	208 V	1	5.0 A
CU-2	ROOF	SOUTH ELECTRICAL ROOM			48,000 Btu/h	R-410A	0.2	460 V	3	0.6 A

HOISTWAY VENTILATION DAMPER SCHEDULE

MARK	LOCATION	DAMPER MANUFACTURER	MODEL	FRAME STYLE	DAMPER WIDTH	DAMPER HEIGHT	ACTUATOR MANUFACTURER	ACTUATOR MODEL
VD-1	S-5 ELEVATOR HOISTWAY	GREENHECK	EAC-601	CHANNEL	21"	21"	HONEYWELL	MS8120F1200

FIRE DAMPER SCHEDULE

MARK	LOCATION	MANUFACTURER	MODEL	FRAME STYLE	DAMPER WIDTH	DAMPER HEIGHT	FUSELINK TEMPERATURE
FD-1	MACHINE ROOM ENCLOSURE SUPPLY	RUSKIN	DIBD20W-1	BC STYLE	24"	16"	165 °F
FD-1	MACHINE ROOM ENCLOSURE SUPPLY	RUSKIN	DIBD20W-1	BC STYLE	24"	16"	165 °F
FD-1	MACHINE ROOM ENCLOSURE SUPPLY	RUSKIN	DIBD20W-1	BC STYLE	24"	16"	165 °F
FD-2	MACHINE ROOM ENCLOSURE RETURN	RUSKIN	DIBD20-1	B STYLE	44"	44"	165 °F

ROOM AIR BALANCE SCHEDULE

AREA AND/OR ROOM SERVED	AIR TERMINAL MARK	AREA (SQ. FT.)	EQUIPMENT COOLING LOAD (BTU/HR)	AIRFLOW (CFM)	
				SUPPLY	RETURN
PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	RG-1	1653	146000	0	6495
PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	RG-1	1653	146000	0	6495
T-4 ELEVATOR MACHINE ROOM	RG-2	152	3000	0	210
PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	SD-1	1653	48667	1968	0
PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	SD-1	1653	48667	1968	0
PENTHOUSE ELEVATOR MACHINE ROOM ENCLOSURE	SD-1	1653	48667	1968	0
T-4 ELEVATOR MACHINE ROOM	SD-2	152	3000	210	0

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100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — Robert Brown — 57852 — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL GENERAL INFORMATION

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number M-001

Dwg 1 of 6

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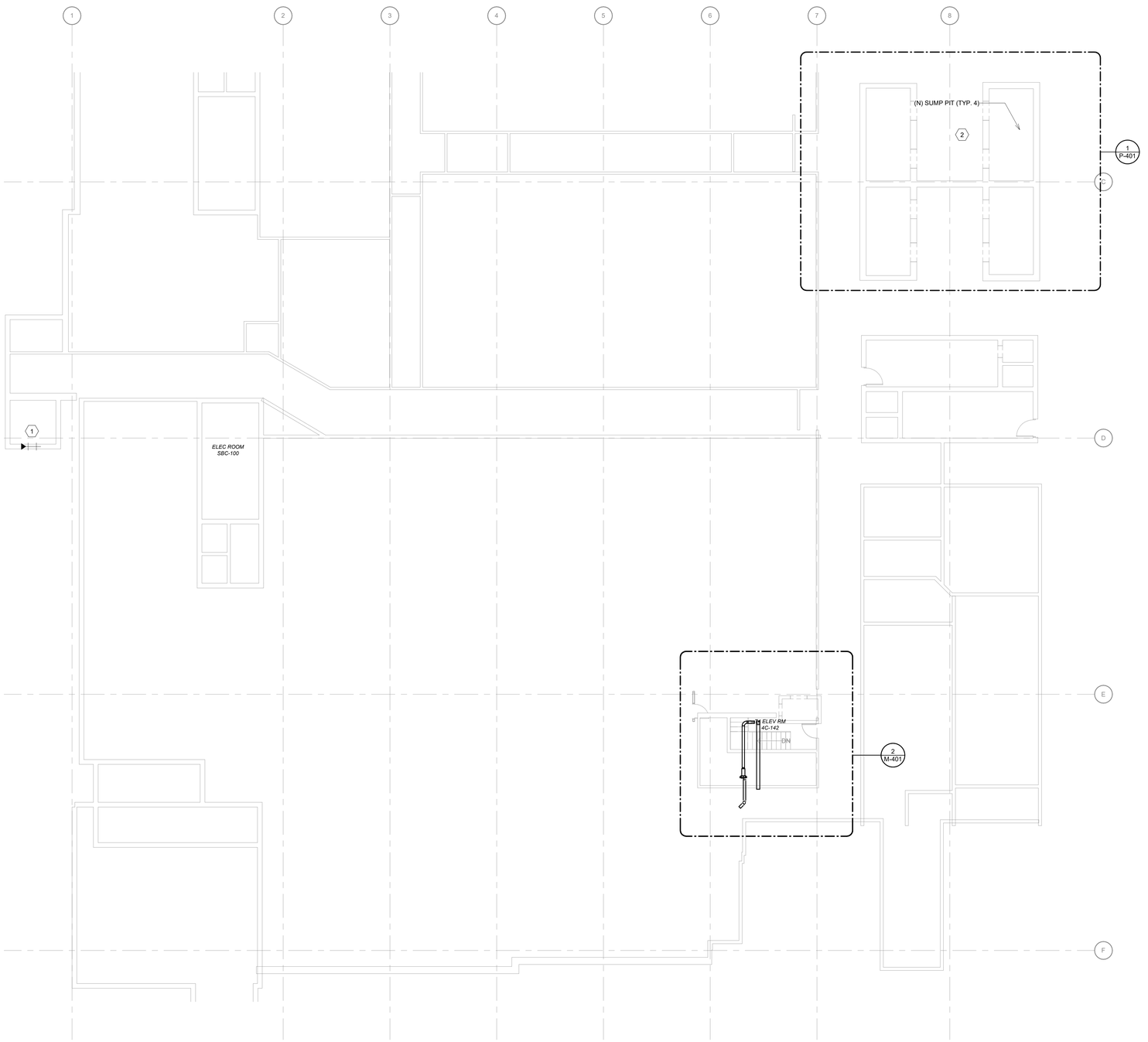


1 **Basement HVAC - Plan**
Scale: 1" = 10'-0"

0 5 10 20

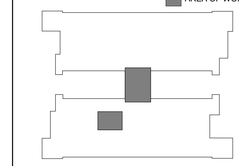
TRUE NORTH

KEY NOTES:

1 INSTALL NEW COMBINATION LOUVER/DAMPER & ACTUATOR TO REPLACE EXISTING VENTILATION LOUVER SERVING THE S-5 ELEVATOR HOISTWAY. THE EXISTING HOISTWAY VENT IS LOCATED AT THE INTERSTITIAL LEVEL BETWEEN THE BASEMENT & 1ST FLOOR LEVELS. THE HOISTWAY VENT IS ACCESSED FROM THE 1ST FLOOR LEVEL.

2 REFER TO P-401 FOR SUMP PUMP INSTALLATION ENLARGED PLANS.

KEY PLAN
SCALE: NO SCALE



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#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER 57882 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 BASEMENT HVAC PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

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VA PROJECT NUMBER: 501-19-101

Building Number: # 41

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Dwg 2 of 6

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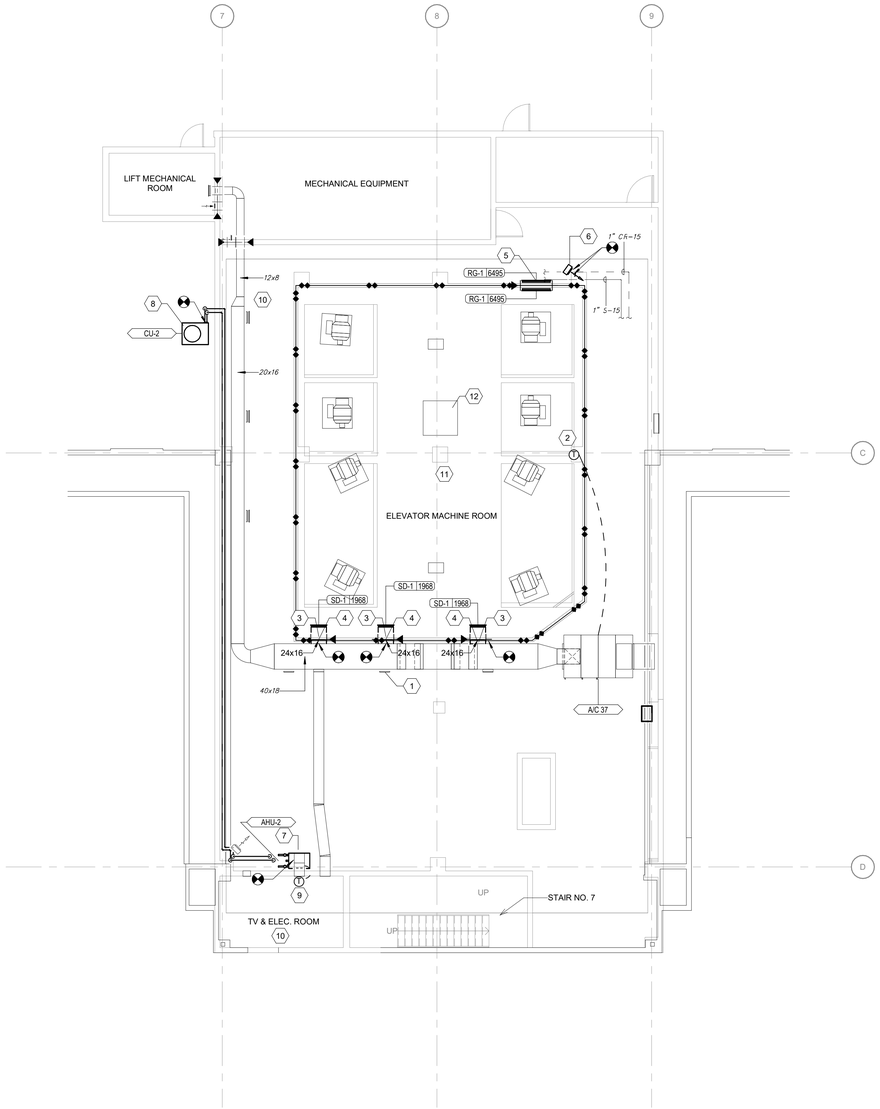
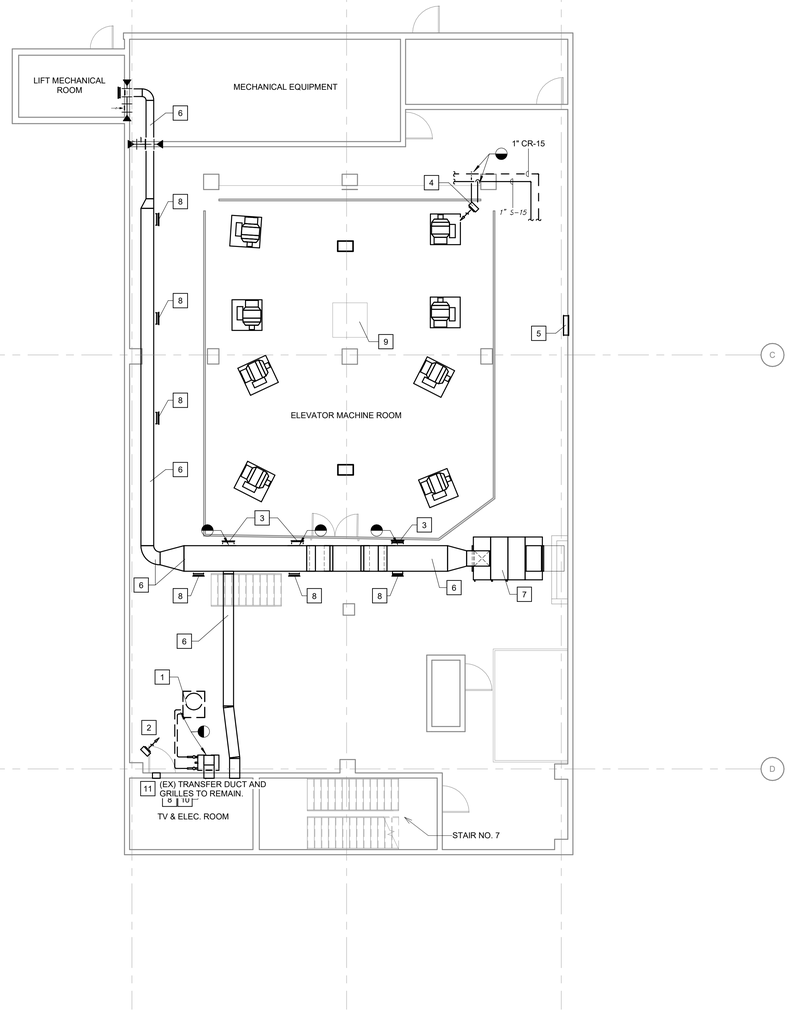


2 Penthouse - Mechanical Plan

Scale: 1/8" = 1'-0"



1 Penthouse - Mechanical Demolition Plan

Scale: 1/8" = 1'-0"

KEY NOTES:

1 DEMOLISH (EX) DX AIR-HANDLING UNIT, CONDENSING UNIT, CONDENSATE DRAIN PIPING, REFRIGERANT PIPING, AND CONTROLS. EVACUATION AND REMOVAL OF REFRIGERANT SHALL BE PERFORMED BY A LICENSED CONTRACTOR.

2 (EX) HYDRONIC UNIT HEATER TO REMAIN.

3 DEMOLISH (EX) SIDEWALL SUPPLY AIR DIFFUSER & DUCTWORK BACK TO THE MAIN & CAP.

4 CAREFULLY DISCONNECT AND REMOVE (EX) STEAM UNIT HEATER FOR SUBSEQUENT RELOCATION. STORE IN A SECURE LOCATION TO PREVENT DAMAGE UNTIL REINSTALLED.

5 (EX) RELIEF AIR LOUVER TO REMAIN.

6 (EX) SUPPLY AIR DUCT TO REMAIN.

7 (EX) DX AIR HANDLING UNIT TO REMAIN.

8 (EX) SIDEWALL SUPPLY DIFFUSERS AND DUCTWORK TO REMAIN.

9 TEMPORARILY RELOCATE EXISTING SUPPLY AIR DIFFUSER LOCATED IN THE 6TH FLOOR ELEVATOR LOBBY TO ACCOMMODATE EQUIPMENT TRANFER THROUGH THIS PENTHOUSE ACCESS HATCH.

10 (EX) SIDEWALL RETURN GRILLE AND DUCTWORK TO REMAIN.

11 (EX) TRANSFER DUCT AND GRILLES TO REMAIN.

KEY NOTES:

1 CONTRACTOR TO CLEAN ALL SUPPLY/RETURN AIR DIFFUSERS/GRILLES THAT ARE EXISTING TO REMAIN.

2 RELOCATE (EX) T-STAT TO CONTROL THE (EX) AIR-HANDLING UNIT.

3 INSTALL (N) SUPPLY AIR DUCT AND SIDEWALL DIFFUSERS, AS SHOWN, TO SERVE THE (N) ELEVATOR MACHINE ROOM ENCLOSURE.

4 INSTALL (N) FIRE DAMPER WHERE (N) SUPPLY AIR DUCT PENETRATES THE (N) 2-HR WALL ASSEMBLY.

5 INSTALL (N) 44"X44" RETURN AIR GRILLE ON BOTH SIDES OF THE NEW WALL. INSTALL (N) FIRE DAMPER IN THE (N) 2-HR WALL ASSEMBLY.

6 RELOCATE (EX) STEAM UNIT HEATER TO PROVIDE HEATING FOR THE PENTHOUSE PASSAGEWAY. RE-CONNBOT (EX) UNIT HEATER TO STEAM/CONDENSATE PIPING. MINIMIZE OBSTRUCTION TO ALL PASSAGEWAY EGRESS ROUTES. PROVIDE IMPACT PADDING ON LOW-HANGING EQUIPMENT/PIPING, AS REQUIRED.

7 INSTALL (N) 4-TON DX AIR-HANDLING UNIT TO SERVICE THE ADJACENT ELECTRICAL ROOM. CONNECT SUPPLY/RETURN OUTLETS OF (N) UNIT TO (EX) SUPPLY/RETURN DUCTWORK. ROUTE REFRIGERANT PIPING TO (N) CONDENSING UNIT ON THE ROOF. PIPE NEW CONDENSATE DRAIN TO EXISTING FLOOR DRAIN APPROXIMATELEY 4 FEET BELOW UNIT.

8 INSTALL (N) 4-TON DX CONDENSING UNIT ON THE ROOF, ADJACENT TO THE PENTHOUSE. LOCATE (N) CONDENSING UNIT AT LEAST 10' FROM PARAPET WALLS, UPSLOPE FROM EXISTING SPLASH BLOCKS, & CLEAR OF EXISTING INTAKE/RELIEF GRILLES. CONNECT (N) CONDENSING UNIT REFRIGERANT PIPING TO INSIDE AIR-HANDLING UNIT, LOCATED IN THE PENTHOUSE.

9 INSTALL (N) T-STAT TO CONTROL THE (N) DX AIR-HANDLING UNIT ON WALL BETWEEN EXISTING SUPPLY DIFFUSER AND RETURN GRILLE.

10 CONTRACTOR SHALL PROVIDE 4-TONS OF TEMPORARY COOLING FOR THE ELECTRICAL/T.V. ROOM & 1-TON OF COOLING FOR THE COMMUNICATION EQUIPMENT ADJACENT TO THE ELEVATOR EQUIPMENT DURING THE CONSTRUCTION PERIOD.

11 CONTRACTOR SHALL REBALANCE ALL SUPPLY/RETURN AIR REGISTERS SERVING THE PENTHOUSE, IN ACCORDANCE WITH THE ROOM AIR BALANCE SCHEDULE.

12 REPLACE SUPPLY AIR DIFFUSER IN THE 6TH FLOOR LOBBY IN ITS ORIGINAL LOCATION UPON COMPLETION OF WORK ON THE 6TH FLOOR.

KEY PLAN

SCALE: NO SCALE

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED ARCHITECT ROBERT ARNOLD HAY 57882 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511

www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 PENTHOUSE HVAC PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

Drawing Number: M-107

Dwg 3 of 6

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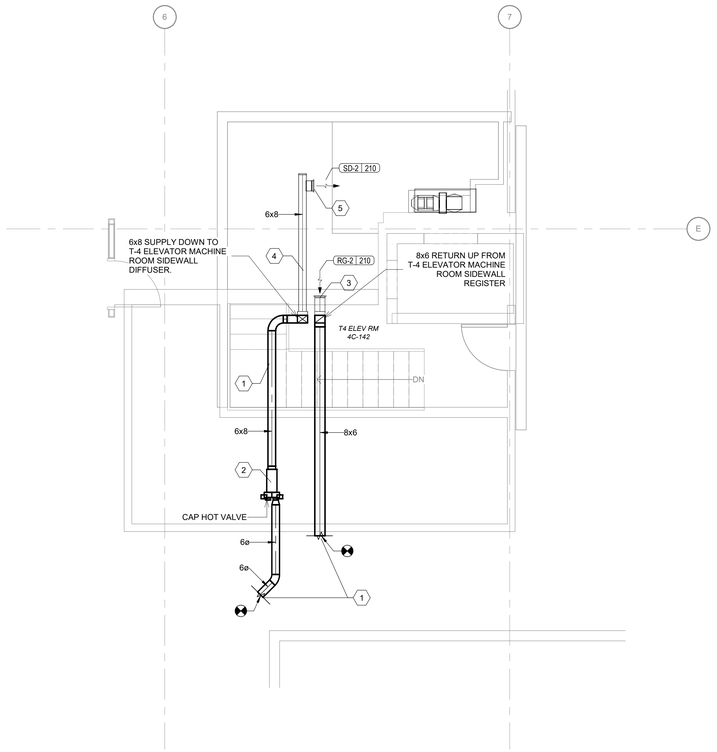
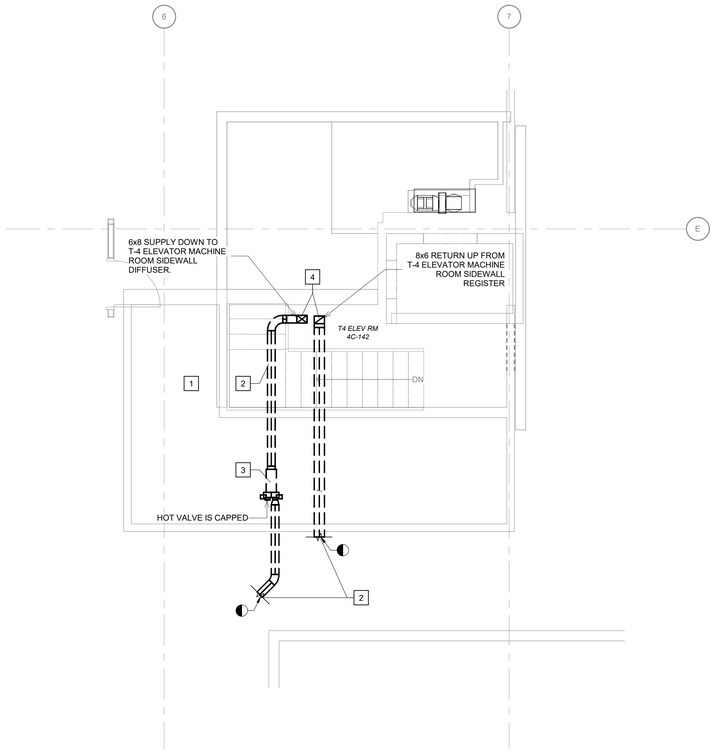


2 T-4 Machine Room - Enlarged Plan

Scale: 1/4" = 1'-0"



1 T-4 Machine Room - Enlarged Demolition Plan

Scale: 1/4" = 1'-0"

KEY NOTES:

1 ALL DEMOLITION WORK IN THIS AREA SHALL BE PERFORMED USING GLOVEBAG ASBESTOS ABATEMENT PROCEDURES (SECTION 02 82 13), AS OUTLINED IN THE PROJECT SPECIFICATIONS. APPROXIMATELY 25' OF ACM INSULATION ON THE SUPPLY DUCTWORK SHALL BE ABATED.

2 DEMOLISH EXISTING SUPPLY/RETURN DUCTWORK BACK TO THE BRANCH TAKE-OFF POINT OF CONNECTION.

3 DEMOLISH EXISTING AIR TERMINAL UNIT SERVING THE T-4 ELEVATOR MACHINE ROOM.

4 DEMOLISH EXISTING SUPPLY/RETURN DUCTWORK DOWN TO AND INCLUDING THE SUPPLY/RETURN AIR SIDEWALL DIFFUSER/REGISTER SERVING THE T-4 ELEVATOR MACHINE ROOM.

KEY NOTES:

1 INSTALL NEW SUPPLY/RETURN DUCTWORK, AS SHOWN, TO SERVE THE T-4 ELEVATOR MACHINE ROOM.

2 INSTALL NEW TERMINAL AIR UNIT SET FOR 210 CFM TO SERVE THE T-4 ELEVATOR MACHINE ROOM. REPLACE EXISTING T-STAT WITH NEW, TO MAINTAIN SPACE TEMPERATURE.

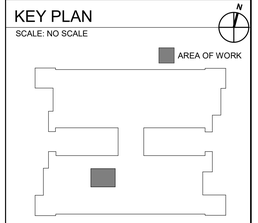
3 INSTALL NEW RETURN AIR SIDEWALL REGISTER TO SERVE THE T-4 ELEVATOR MACHINE ROOM.

4 EXTEND 6"X8" SUPPLY DUCT INTO THE T-4 ELEVATOR MACHINE ROOM, AS SHOWN. THE EXISTING FIRE PROTECTION PIPING WILL NEED TO BE RE-ROUTED TO ACCOMMODATE THIS DUCT EXTENSION.

5 INSTALL NEW SUPPLY AIR SIDEWALL DIFFUSER TO SERVE THE T-4 ELEVATOR MACHINE ROOM.

KEY PLAN

SCALE: NO SCALE



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#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED ROBERT V. KAMINSKI 37552 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ENLARGED MECHANICAL PLANS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER 501-19-101

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Approved: Project Director

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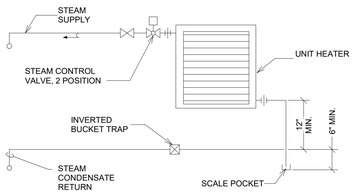
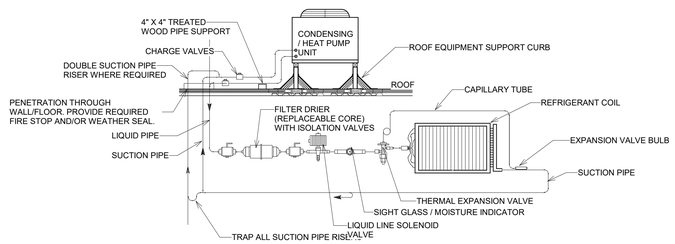


PIPING CONNECTIONS TO HORIZONTAL TYPE STEAM UNIT HEATER

NOTES:
1. UNIT MOUNTED THERMOSTAT SHALL MAINTAIN SPACE TEMPERATURE BY CYCLING THE FAN. THE CONTROL VALVE SHALL BE INTERLOCKED WITH THE FAN.

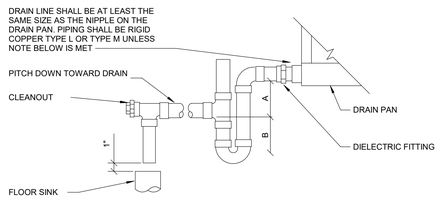
10 STEAM UNIT HEATER
Scale: 1/2" = 1'-0"



NOTES:
1. REFRIGERANT PIPING AND SPECIALTIES SHALL BE SIZED PER CONDENSING UNIT MANUFACTURERS RECOMMENDATIONS.
2. EXPANSION VALVE BULB TO BE MOUNTED AT THREE (3) O'CLOCK POSITION.
3. ALL REFRIGERANT PIPING SHALL BE CONTINUOUSLY PURGED WITH NITROGEN DURING BRAZING PROCESS.
4. ALL ELBOWS TO BE LONG RADIUS TYPE.
5. SLOPE SUCTION PIPES 1/2" PER 10'-0" IN DIRECTION OF FLOW.

REFRIGERANT COIL PIPING DETAIL

7 REFRIGERANT COIL PIPING DETAIL
Scale: 1/8" = 1'-0"

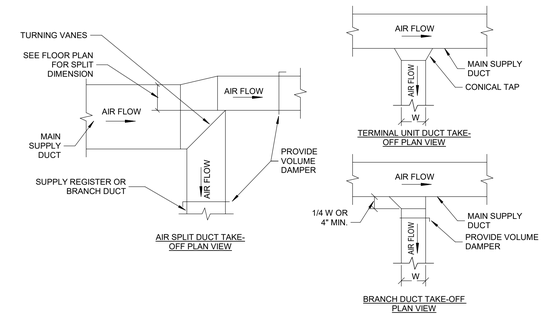


NOTES:
1. CPVC PIPE MAY BE USED ONLY IF APPROVED BY LOCAL VA AND IS INDOORS AND DOES NOT PASS THROUGH RATED BARRIERS.
2. DIELECTRIC FITTING TO BE USED WHEN TWO DISSIMILAR METALS ARE TO BE CONNECTED.

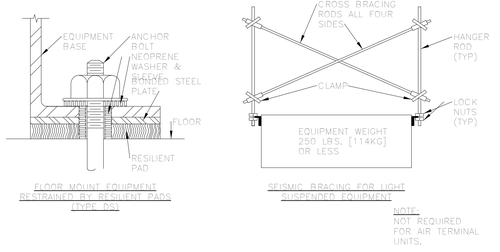
UNIT TYPE	A	B
DRAW THRU	2" PLUS X	X
BLOW THRU	1" MINIMUM	2X

WHERE X = STATIC PRESSURE IN PAN

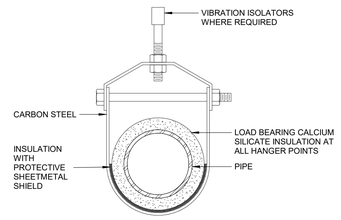
4 AIR HANDLING UNIT DRAIN TRAP DETAIL
SCALE: N.T.S.



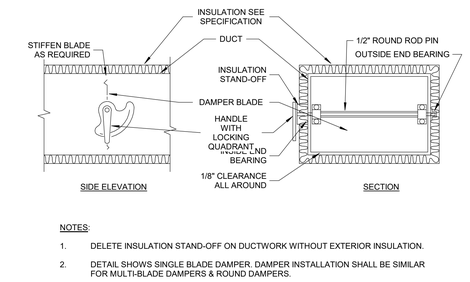
1 SUPPLY DUCT TAKE-OFFS
Scale: N.T.S.



11 SEISMIC BRACING FOR EQUIPMENT
Scale: N.T.S.

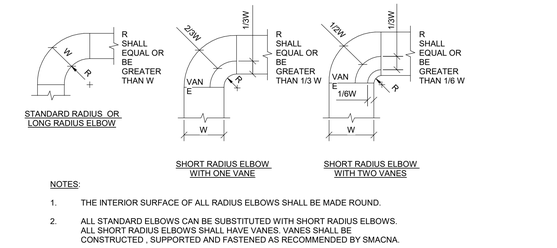


8 CLEVIS PIPE HANGER DETAIL
Scale: N.T.S.



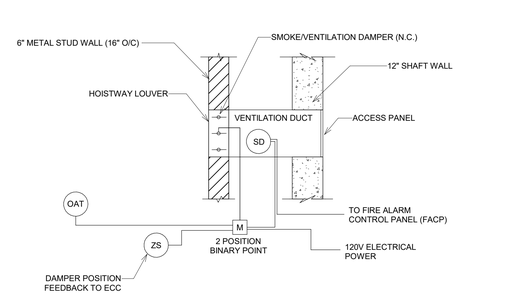
NOTES:
1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

5 VOLUME DAMPER DETAIL
Scale: N.T.S.



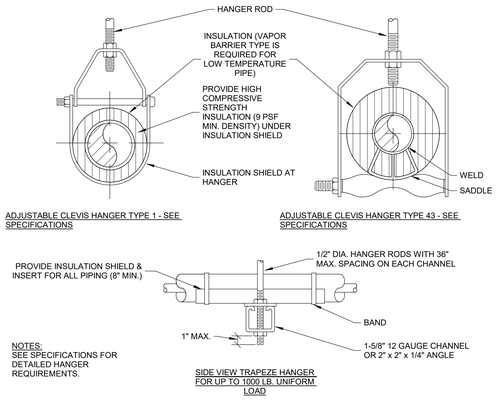
NOTES:
1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED , SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

2 DUCTWORK RADIUS ELBOW
Scale: N.T.S.



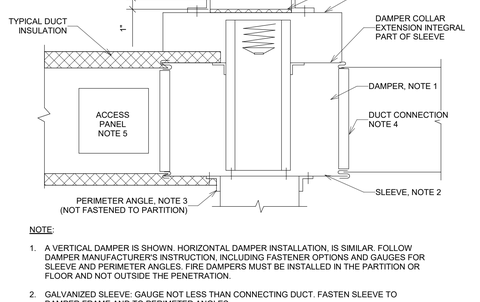
NOTE:
1. UPON DETECTION OF SMOKE BY THE SMOKE DETECTOR, THE DAMPER SHALL CLOSE AND SEND AN ALARM TO THE FACP.
2. THE DAMPER SHALL BE ENERGIZED OPEN WHEN OAT >= 70F (ADJ); OTHERWISE, THE DAMPER SHALL BE NORMALLY CLOSED WHEN OAT < 70F (ADJ).

12 HOISTWAY VENTILATION DAMPER
Scale: N.T.S.



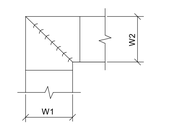
MAXIMUM PIPE/TUBING SUPPORT SPACING													
NOM. SIZE (IN.)	THRU 3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12
PIPE (FT.)	7	7	7	9	10	11	12	14	16	17	19	22	23
TUBING (FT.)	5 FT	6	7	8	8	9	10	12	13	14	16	-	-
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE													

9 PIPE HANGER
Scale: N.T.S.



NOTE:
1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTION, INCLUDING FASTENER OPTIONS AND GAUGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE: GAUGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGLES: GALVANIZED STEEL, NOT LESS THAN 1 1/2" x 1 1/2", 14 GAUGE, TO PROVIDE 1" MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA, ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.
5. PROVIDE 1/4" TO 1/2" CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.
6. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

6 SECTION THRU FIRE DAMPER INSTALLATION
Scale: N.T.S.



NOTES:
1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.
2. WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE REGARDLESS OF W DIMENSION.
3. ALL SINGLE THICKNESS VANES SHALL HAVE A 2" RADIUS, 1-1/2" MAXIMUM SPACE BETWEEN VANES AND A 3/4" TRAILING EDGE.
4. WHEN W EQUAL W2 AND W1 IS GREATER THAN 20" VANES SHALL BE DOUBLE VANE TYPE.

3 DUCTWORK SQUARE VANE ELBOWS
Scale: N.T.S.

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — Robert Brown — 57882 — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL DETAILS

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

Drawing Number: M-501

Dwg 5 of 6

1/24/2023 6:00:59 AM

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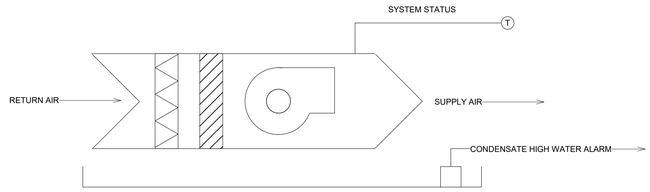
DX AIR HANDLING UNIT (COOLING ONLY)

OPERATION:
T-STAT CONTROLLED WITH STATUS OUTPUT TO DDC SYSTEM.
FAN:
THE FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN FROM THE CONDENSING UNIT, UNLESS THE UNIT HAS BEEN SHUTDOWN BY INTERNAL SAFETIES.
COOLING:
WHEN COOLING IS CALLED FOR BY THE WALL-MOUNTED TEMPERATURE SENSOR OR T-STAT PROVIDED WITH THE UNIT, THE CONDENSING UNIT SHALL RUN TO MAINTAIN TEMPERATURE SET POINT.

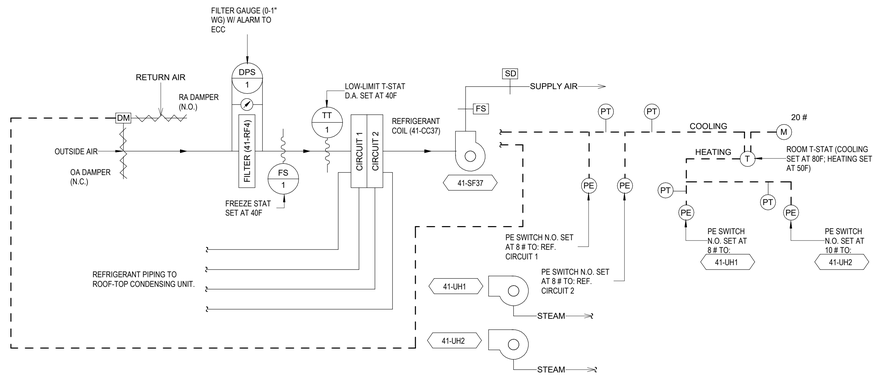
SETPOINTS:
THE MAINTENANCE TEAM SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE COOLING SET POINT AT THE TEMPERATURE SENSOR.
COOLING: 86°F (ADJ.)

ALARMS:
SPACE TEMPERATURE - IF THE SPACE TEMPERATURES EXCEEDS 95°F
HIGH WATER - IF THE CONDENSATE LEVEL REACHES THE WATER DETECTION SENSOR IN THE DRAIN PAN



	HARDWARE POINTS				SOFTWARE POINTS						
POINT NAME	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC
ZONE TEMPERATURE	X						X		X	X	X
ZONE TEMPERATURE SETPOINT	X										X
STATUS			X						X		X
HIGH WATER ALARM			X							X	X

1 AHU 2 CONTROL DIAGRAM
Scale: N.T.S.



2 41 A/C 37 CONTROL DIAGRAM (FOR REFERENCE ONLY)
Scale: N.T.S.

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — Robert Arnold — 37552 — 1/24/2023

PROJECT MANAGER:

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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ACG Project Number 19-262

Office of Construction and Facilities Management

VA | U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL CONTROLS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

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VA PROJECT NUMBER 501-19-101

Building Number # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: RHA | Drawn: RHA

Drawing Number M-502

Dwg 6 of 6

1/24/2023 6:01:00 AM

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LIGHTING FIXTURE SCHEDULE

SYMBOL	LABEL	TYPE OF LAMP	BALLAST/ DRIVER	WATTS/ FIXTURE	VOLTAGE	DESCRIPTION	MANUFACTURER	BASIS OF DESIGN MANUFACTURER/CATALOG NUMBER
	A1	LED	120-277 V	36W	277V	4' LINEAR STRIPLIGHT FX SERIES, HANGED	INDUSTRIAL LIGHTING PRODUCTS	FX4-36W-U-40
	B1	LED	120-277 V	51W	277V	4' BOX LIGHT - SURFACE MOUNTED	GENERAL ELECTRIC	WS-4N-0-A3-S-W
	C1	LED	120-277 V	12W	277V	4' LINEAR STRIPLIGHT, FX SERIES, WALL MOUNTED	INDUSTRIAL LIGHTING PRODUCTS	FXS4-12W-U-40
	X1	LED	120-277 V	3W	277V	EXIT SIGN - END MOUNTED	COMPASS	CER-END MOUNTING
	X2	LED	120-277 V	3W	277V	EXIT SIGN - CEILING MOUNTED	COMPASS	CER-CEILING MOUNTING

NOTES:
1. MANUFACTURE AND CATALOG NUMBERS SHOWN ARE FOR BASIS OF DESIGN, DESCRIPTIVE AND QUALITY STANDARDS ONLY, NOT TO BE USED FOR ORDERING WITHOUT VERIFICATION AND APPROVAL. CONTRACTOR TO PROVE PRODUCT OR EQUAL FOR APPROVAL BY OWNER, ARCHITECT AND ENGINEER. ENGINEER SHALL NOT BE RESPONSIBLE FOR MISMATCHED OR INACCURATE PART NUMBERS.
2. EM NL - SWITCHED EMERGENCY LIGHT (CIRCUITED FORM EMERGENCY POWER).
3. FOR ALL LED LIGHT FIXTURES. THE FIXTURE MUST BE CAPABLE OF SELF-RESETTING TO THE SWITCHED/CONTROLLED STATE DURING ANY FLUCTUATION IN POWER SUPPLY WHERE AUTOMATIC PROTECTIVE MEASURES DISABLE THE LED LAMPS. PROVIDE A LETTER OR STATEMENT FROM THE MANUFACTURER, OR OTHER ACCEPTABLE PROOF, THAT ALL LED FIXTURE, WITH OR WITHOUT BROWNOUT PROTECTION, WILL RETURN TO THE SWITCHED/CONTROLLED STATE AUTOMATICALLY. PROVIDE STATEMENT WITH THE FIXTURE SUBMITTALS.

ELECTRICAL SYMBOL NOTES

A1 b / EM — THE LIGHTING FIXTURE TYPE IS INDICATED BY AN UPPER CASE LETTER OR AN UPPER CASE LETTER AND NUMBER.
THE SWITCH DESIGNATION (IF NEEDED) IS INDICATED BY A LOWER CASE LETTER.
EM INDICATES THE LIGHT FIXTURE TO BE CIRCUITED ONTO EMERGENCY CURCUIT.
N INDICATED THE LIGHTING FIXTURE TO BE CIRCUITED ONTO NORMAL CIRCUIT.

EXAMPLE: LIGHTING FIXTURE TYPE 'A1' IS CONTROLLED BY SWITCH 'b' AND 'EM' DESIGNATES THAT THE FIXTURE IS CIRCUITED ONTO EMERGENCY POWER.

EXIT SIGNS: STEM INDICATES WALL MOUNTING. NO STEM INDICATES CEILING MOUNTING. SHADED AREA INDICATES ILLUMINATED FACE(S). ARROW INDICATES DIRECTIONAL ARROW ON ILLUMINATED FACE(S).

E1 — EXAMPLE 1: WALL MOUNTED EXIT SIGN TYPE 'E1' WITH SINGLE FACE AND DIRECTIONAL ARROW.

E2 — EXAMPLE 2: CEILING MOUNTED EXIT SIGN TYPE 'E2' WITH DOUBLE FACE AND DIRECTIONAL ARROWS.

DEVICES: THE SWITCH DESIGNATION IS INDICATED BY A LOWER CASE LETTER.

c — EXAMPLE: SPLIT DUPLEX RECEPTACLE; ONE RECEPTACLE OUTLET IS CONTROLLED BY SWITCH 'c'.

THE CONTROL DEVICE DESIGNATION IS INDICATED BY A LOWER CASE LETTER.

d — EXAMPLE: SINGLE POLE SWITCH 'd' TO CONTROL LIGHTING FIXTURES INDICATED BY 'd'.

T1 — TRANSFORMERS: THE TRANSFORMER TYPE IS INDICATED BY A NUMBER FOLLOWING THE UPPER CASE LETTER 'T'. SEE THE TRANSFORMER SCHEDULE OR THE SINGLE LINE DIAGRAM FOR THE TRANSFORMER DESCRIPTION AND REQUIREMENTS.

EXAMPLE: TRANSFORMER TYPE 'T1'.

'LPN' — PANELBOARDS: PANELBOARD DOORS MAY BE SHOWN TO INDICATE OPENING SIDE OF RECESSED PANELBOARDS. SEE PANELBOARD IDENTIFICATION FOR DESIGNATION CODES.

— SHEET KEY NOTE: SEE THE SHEET KEY NOTES ON THAT SHEET FOR THE NOTE NUMBER INDICATED IN THE HEXAGON.

— DEMOLITION KEY NOTE: SEE THE SHEET KEY NOTES ON THAT SHEET FOR THE NOTE NUMBER INDICATED IN THE SQUARE.

'LPN'-1,3,5 — HOME RUN TO BRANCH CIRCUIT PANEL: THE PANEL DESIGNATION AND CIRCUIT DESIGNATION ARE SHOWN ADJACENT TO THE HOME RUN ARROW.
CIRCUIT BREAKER SIZES (AMPS/NUMBER OF POLES) ARE SHOWN IN THE PANEL SCHEDULE WITH THE CORRESPONDING PANEL AND CIRCUIT DESIGNATION.

EXAMPLE: HOME RUN TO PANELBOARD 'LPN'; CIRCUITS 1, 3, 5.

SYMBOL NOTATIONS: UPPER CASE LETTERS ADJACENT TO SYMBOLS INDICATE A UNIT TYPE. SEE APPROPRIATE SCHEDULE OR SPECIFICATIONS.

ELECTRICAL SYMBOL LEGEND

SYMBOL	HEIGHT	DESCRIPTION
	18"	120V DUPLEX RECEPTACLE
	18"	120V DUPLEX RECEPTACLE EMERGENCY OUTLET AND COVER PLATE SHALL BE RED IN COLOR
	18"	120V QUADRUPLEX RECEPTACLE
	18"	120V QUADRUPLEX RECEPTACLE EMERGENCY OUTLET AND COVER PLATE SHALL BE RED IN COLOR
	18"	208V DUPLEX RECEPTACLE
	18"	SPECIAL RECEPTACLE
		120V DUPLEX RECEPTACLE FLOOR BOX
		120V DUPLEX RECEPTACLE EMERGENCY FLOOR BOX OUTLET AND COVER PLATE SHALL BE RED IN COLOR
		120V QUADRUPLEX RECEPTACLE FLOOR BOX
		120V QUADRUPLEX RECEPTACLE EMERGENCY FLOOR BOX OUTLET AND COVER PLATE SHALL BE RED IN COLOR
		RECEPTACLE MODIFIERS: AC: 3" ABOVE COUNTERTOP/BACKSPLASH GFI: GROUND FAULT CURRENT INTERRUPTER WP: WEATHERPROOF ENCLOSURE DED: DEDICATED CIRCUIT
	AS NOTED	JUNCTION BOX, WALL MOUNTED, PURPOSE AS NOTED
CLNG		JUNCTION BOX, CEILING MOUNTED, PURPOSE AS NOTED
		JUNCTION BOX, FLOOR MOUNTED, PURPOSE AS NOTED
E	AS NOTED	EQUIPMENT CONNECTION
	72" TOP	DISCONNECT SWITCH NON-FUSED
	72" TOP	DISCONNECT SWITCH FUSED
$	48"	SINGLE POLE WALL SWITCH: 48" AFF STANDARD UNO
	48"	ELEVATOR MOTOR CONTROL SWITCHES
T		TRANSFORMER
		FLOOR MOUNTED MOTOR TRANSFER SWITCH
		SWITCH MODIFIERS: M: MOTOR-RATED

ALL HEIGHTS ARE TO CENTER OF DEVICE UNLESS NOTED OTHERWISE.
TOP: HEIGHT TO TOP OF DEVICE
ANY HEIGHTS INDICATED IN PLANS SHALL SUPERCEDE THOSE LISTED HERE.

LIGHTING SYMBOL LEGEND

SYMBOL	HEIGHT AFF *	DESCRIPTION
	---	2' X 2' RECESSED DIRECT/INDIRECT TROFFER
	---	2' X 4' RECESSED DIRECT/INDIRECT TROFFER
	---	2' X 4' RECESSED FLAT PRISMATIC LENS TROFFER
	3'-0" CENTER	2' LINEAR - WALL MOUNTED
	3'-0" CENTER	4' LINEAR - WALL MOUNTED
	3'-0" CENTER	6" DIAMETER WALL MOUNTED MAINTENANCE LIGHT
	---	6" DIAMETER RECESSED DOWNLIGHT
	7'-5" BOTTOM	EXIT SIGN - WALL MOUNTED
	---	EXIT SIGN - CEILING MOUNTED
	7'-6" CENTER	EMERGENCY LIGHT BATTERY OPERATED - WALL MOUNTED
	6'-0" CENTER	WALL SCONCE
$	48" CENTER	SINGLE POLE WALL SWITCH
		SWITCH MODIFIERS: OS: OCCUPANCY SENSOR, DUAL TECHNOLOGY VS: VACANCY SENSOR, DUAL TECHNOLOGY LV: LOW VOLTAGE LVD: LOW VOLTAGE DIMMER D: LINE VOLTAGE DIMMER T: DIGITAL TIMER K: KEYED 3: 3 WAY
OS	---	OCCUPANCY SENSOR, DUAL TECHNOLOGY - CEILING MOUNTED
OS	---	OCCUPANCY SENSOR, DUAL TECHNOLOGY - WALL/CORNER MOUNTED
RC	---	LOW VOLTAGE LIGHTING CONTROL DEVICE
RCD	---	LOW VOLTAGE LIGHTING CONTROL DEVICE WITH 0-10V DIMMING
LS	---	LIGHT LEVEL SENSOR, SINGLE ZONE DIMMING CLOSED LOOP - CEILING MOUNTED

* - ANY HEIGHTS INDICATED IN PLANS SHALL SUPERCEDE THOSE LISTED HERE.

CONSTRUCTION PHASING PLAN

THE GOAL OF THE ELECTRICAL PHASING PLAN IS TO EFFICIENTLY EXECUTE THE CONSTRUCTION OF THIS PROJECT WHILE KEEPING THE POWER OUTAGES OF THE ELEVATORS AND DISRUPTIONS TO THE MEDICAL CENTER OPERATIONS TO A MINIMUM.

I. INSTALL NEW PANELS "ATP7" , "ATL7" & "ALL7"
- A. INSTALL NEW PANEL "ATP7"
  1. EXTEND EXISTING PANEL FEEDERS, SIZE AS SHOWN ON E-601, FROM EXISTING PANEL TO NEW PANEL AND COMPLETE TERMINATIONS OF ALL FEEDER CONDUCTORS.
     NOTE: ALL MATERIALS REQUIRED TO COMPLETE THIS WORK SHALL BE ON HAND PRIOR TO SHUTTING OFF POWER TO EXISTING PANEL
- B. INSTALL NEW TRANSFORMER "BTT7", NEW PANELS "BTL7" AND "ALL7"
  1. ALL CIRCUITS CONNECTED TO EXISTING PANEL "BTL7" SHALL BE REROUTED AND CONNECTED TO NEW PANEL "BTL7"
  2. ALL EXISTING CAB LIGHTING CIRCUITS SHALL BE REROUTED AND CONNECTED TO NEW PANEL "ALL7"
- C. INSTALLATION AND CONNECTION OF NEW PANEL "ATP7" FEEDERS SHALL BE DONE ON A WEEKEND AT NIGHT TIME, 12MN-6AM.
- D. ALL PANELS UNDER ITEM I SHALL BE COMPLETED UNDER PHASE 1 OF THE PROJECT PHASING PLAN.

II. INSTALL NEW PANEL "BTP7"
- A. DISCONNECT AND REMOVE EXISTING TRANSFORMER "BTT7, INCLUDING ASSOCIATED PRIMARY AND SECONDARY WIRING."
- B. FOLLOW THE SAME INSTALLATION PROCEDURE AS IN NEW PANEL "ATP7"
- C. INSTALLATION AND CONNECTION OF NEW PANEL "BTP7" FEEDERS SHALL BE DONE ON A WEEKEND AT NIGHT TIME, 12MN-6AM.
- D. ALL WORK UNDER ITEM II SHALL BE COMPLETED UNDER PHASE 1 OF THE PROJECT PHASING PLAN.

III. DEMOLITION AND INSTALLATION OF PASSENGER AND SERVICE ELEVATORS
- A. DISCONNECT AND REMOVE EXISTING ELEVATOR'S CONTROL PANEL AND DISCONNECT SWITCH, INCLUDING ASSOCIATED POWER WIRING. CONTROL WIRING ASSOCIATED WITH THE AUTOMATIC TRANSFER SWITCH SHALL BE TERMINATED AND PROPERLY TAPED IN A JUNCTION BOX.
- B. INSTALL NEW ELEVATOR CONTROL PANEL AND DISCONNECT SWITCH, INCLUDING CONNECTING NEW POWER WIRING TO EACH ELEVATOR'S RESPECTIVE POWER PANEL. RECONNECT REQUIRED CONTROL WIRING.
- C. PROJECT PHASING PLAN SHALL BE FOLLOWED WHICH PARTICULAR ELEVATORS SHALL BE WORKED ON UNDER ITEM III. COORDINATE WITH ELEVATOR VENDOR AND OTHER TRADES ALL SCOPE OF ELECTRICAL WORK REQUIRED TO COMPLETE THE ELEVATOR INSTALLATION IN A GOOD WORKING CONDITION.

IV. OTHER ELECTRICAL SCOPE OF WORK INDICATED ON THE DRAWINGS SHALL BE INSTALLED AS PER REQUIREMENTS UNDER THE PROJECT PHASING PLAN ON G-100.

NOTE:
CONSTRUCTION PHASING PLAN ABOVE IS A RECOMMENDED SEQUENCE, CONTRACTOR TO SUBMIT A DETAILED PHASING PLAN WITH ITEMS I, II, III, AND IV TO BE INSTALLED AND VERIFIED TO BE WORKING WITHOUT ISSUE.

GENERAL ELECTRICAL NOTES

1. ALL ELECTRICAL DEVICES, FIXTURES, EQUIPMENT AND FEEDERS SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, THE MANUFACTURER'S RECOMMENDED PROCEDURES, ALL APPLICABLE LOCAL AND STATE CODES, AMERICANS WITH DISABILITIES ACT AND WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND VA STANDARDS.
2. EXISTING DRAWINGS ARE KNOWN INFO FROM VA AND DURING SITE OBSERVATION AND SURVEY. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
3. PROVIDE ADDITIONAL SUPPORT FOR DEVICES, FIXTURES, EQUIPMENT AND FEEDERS WHERE THE BUILDING CONSTRUCTION IS NOT SUITABLE FOR DIRECT MOUNTING.
4. FIRESTOP, DRAFTSTOP, SMOKESTOP AND/OR PROTECT THE ANNULAR SPACE AROUND ALL PENETRATIONS THROUGH WALLS, PARTITIONS, FLOORS, CEILING, AND ROOFS IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, UL LISTING REQUIREMENT AND THE APPLICABLE BUILDING CODES.
5. VERIFY CEILING SYSTEMS AND PROVIDE MOUNTING ACCESSORIES, TRIMS AND ALL REQUIRED MOUNTING HARDWARE TO SUIT THE PARTICULAR INSTALLATION.
6. PROTECT EXISTING UNDERGROUND AND BUILDING INTERIOR UTILITIES DURING CONSTRUCTION.
7. BRANCH CIRCUIT CONDUCTORS SHALL BE 12 AWG COPPER MINIMUM.
8. COORDINATE ANY AND ALL WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION SO AS TO AVOID CONFLICT DURING CONSTRUCTION.
9. ALL PANELS SHALL HAVE TYPED, COMPLETED DIRECTORIES INDICATING EQUIPMENT SERVED AND ROOM NUMBER (AS INDICATED ON FINAL BUILDING ROOM SIGNAGE) OF EQUIPMENT LOCATION, OR SPARE, OR SPACE.
10. MANUFACTURER'S NAME AND MODEL NUMBER ARE GIVEN FOR DESCRIPTIVE PURPOSES, TO INDICATE A QUALITY STANDARD, AND ARE NOT INTENDED TO LIMIT PRODUCTS TO A PARTICULAR MANUFACTURER. PRODUCTS DEEMED EQUAL AND APPROVED BY THE DESIGNER WILL BE ACCEPTED. ALL PRODUCTS MUST COMPLY WITH "BUY AMERICAN ACT".
11. ALL FEEDERS AND CIRCUITRY SHALL BE TORQUED PER THE PANEL, BREAKER, AND/OR PARTICULAR EQUIPMENT MANUFACTURER'S SPECIFICATIONS.
12. CIRCUITRY TO SWITCHES, RECEPTACLES, AND ALL OTHER DEVICES SHALL BE TERMINATED ON THE DEVICE'S SCREW TERMINALS.
13. MOUNTING HEIGHTS INDICATED ARE TO CENTER OF DEVICE, OUTLET, FIXTURE, OR EQUIPMENT UNLESS NOTED OTHERWISE.
14. ALL WIRE TERMINATIONS SHALL BE RATED FOR 75 DEGREES C.
15. ALL CONDUCTORS SHALL HAVE THHN/THWN INSULATION, UNLESS OTHERWISE NOTED.
16. ALL CONDUIT SHALL BE RGS OR EMT UNLESS OTHERWISE NOTED. FMC CONDUIT SHALL BE USED ON VIBRATING EQUIPMENT (MAXIMUM LENGTH OF 6 FEET). PVC SHALL BE USED FOR UNDERGROUND CONDUIT OR WHERE CONCRETE-ENCASED. WHERE VIBRATING EQUIPMENT IS LOCATED OUTSIDE, LFMC CONDUIT SHALL BE USED (MAXIMUM SIX FEET) FOR FINAL CONNECTIONS.
17. ALL ELECTRICAL MATERIALS, DEVICES, APPLIANCES AND EQUIPMENT SHALL BE LABEL LISTED BY AN APPROVED THIRD PARTY TESTING AGENCY.
18. FOR ALL LED FIXTURES, THE FIXTURE MUST BE CAPABLE OF SELF-RESETTING TO THE SWITCHED/CONTROLLED STATE DURING ANY FLUCTUATION IN POWER SUPPLY WHERE AUTOMATIC PROTECTIVE MEASURES DISABLE THE LED LAMPS. PROVIDE A LETTER OR STATEMENT FROM THE MANUFACTURER, OR OTHER ACCEPTABLE PROOF, THAT ALL LED FIXTURES, WITH OR WITHOUT BROWNOUT PROTECTION, WILL RETURN TO THE SWITCHED/CONTROLLED STATE AUTOMATICALLY. PROVIDE STATEMENT WITH THE FIXTURE SUBMITTALS.
19. IN CASE OF CONFLICTS OR DISCREPANCIES WITHIN OR AMONG THE CONTRACT DRAWINGS, THE BETTER QUALITY, MORE STRINGENT REQUIREMENTS OR GREATER QUANTITY OF WORK , AS DETERMINED BY THE GOVERNMENT, SHALL BE PROVIDED.
20. COMPRESSION COUPLINGS SHALL BE USED. NO SET SCREW FITTINGS ARE ALLOWED.
21. MINIMUM CONDUIT SIZE TO BE USED IS 3/4".

ELECTRICAL AND TECHNOLOGY ABBREVIATIONS LIST

1P	1 POLE (2P, 3P, 4P, ETC.)
1PH	1 PHASE
2/C	TWO-CONDUCTOR (3/C, 4/C, ETC.)
W2	TWO-WIRE (3W, 4W, ETC.)
3PH	3 PHASE
A	AMPERE
AAP	ALARM ANNUNCIATOR PANEL
AC	ABOVE COUNTER AIR CONDITIONER ALTERNATING CURRENT
ACC	ACCESSIBLE
ACLG	ABOVE CEILING
ADO	AUTOMATIC DOOR OPENER
A/E	ARCHITECT/ENGINEER
AF	AMP FRAME
AFC (KILOAMPS)	AVAILABLE FAULT CURRENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFI	ARC FAULT CIRCUIT INTERRUPTER
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
APPROX	APPROXIMATELY
ARCH	ARCHITECT, ARCHITECTURAL
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AUDIO VISUAL
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BATT	BATTERY
BC	BARE COPPER
BD	BOARD
BFF	BELOW FINISHED FLOOR
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BASIS OF DESIGN
BYP	BYPASS
C	CONDUIT
CAB	CABINET
CALC	CALCULATED
CAP	CAPACITY
CAT	CATALOG, CATEGORY
CATV	COMMUNITY ANTENNA TELEVISION
CB	CIRCUIT BREAKER
CCR	CONTROL CONTACTOR
CCTV	CLOSED CIRCUIT TELEVISION
cd	CANDELA
CD	CONSTRUCTION DOCUMENTS
CF	CONTRACTOR-FURNISHED
CKT	CIRCUIT
CLG	CEILING
CO	CONTRACTING OFFICER
COAX	COAXIAL CABLE
COMM	COMMUNICATION
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUATION OR CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
COR	CONTRACTING OFFICER'S REPRESENTATIVE
CPT	CONTROL POWER TRANSFORMER
CRI	COLOR RENDERING INDEX
CT	CURRENT TRANSFORMER
CTL	CONTROL
CTV	CABLE TELEVISION
CTR	CENTER
CU	COPPER
CU FT	CUBIC FEET
dB	DECIBEL
DB	DIRECT BURIAL
DC	DIRECT CURRENT
DEG C	DEGREES CELSIUS
DEG F	DEGREES FAHRENHEIT
DEMO	DEMOLISH/DEMOLITION
DEPT	DEPARTMENT
DIA	DIAMETER
DISC	DISCONNECT
DIST	DISTRIBUTION
DN	DOWN
DS	SAFETY DISCONNECT SWITCH
DT	DOUBLE THROW
DVC	DIGITAL VOICE COMMAND
DVR	DIGITAL VIDEO RECORDER
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EEB	EMERGENCY EXIT BUTTON
EG	EQUIPMENT GROUND
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EMI	ELECTROMAGNETIC INTERFERENCE
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EPO	EMERGENCY POWER OFF
EQUIP	EQUIPMENT
ES	ELECTRICAL STRIKE
ESMT	EASEMENT
ETR	EXISTING TO REMAIN
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WALL HEATER ELECTRIC WATER HEATER
EX	EXISTING
EXP	EXPLOSION PROOF
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FC	FOOTCANDLE
FCU	FAN COIL UNIT
FIXT	FIXTURE
FLR	FLOOR
FLUOR	FLUORESCENT
FO	FIBER OPTIC
FU	FUSE
FUDS	FUSED SAFETY DISCONNECT SWITCH
FVR	FULL VOLTAGE REVERSING
FVNR	FULL VOLTAGE NON-REVERSING
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
GRS	GALVANIZED RIGID STEEL (CONDUIT)
GYP BD	GYPSUM BOARD
HID	HIGH-INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HT	HEIGHT
HTR	HEATER
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
IES	ILLUMINATION ENGINEERING SOCIETY
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
IR	INFRARED
IT	INTERCOMMUNICATION ROOM
I/W	INTERLOCK WITH
IWH	INSTANTANEOUS WATER HEATER
J-BOX	JUNCTION BOX
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
LED	LIGHT-EMITTING DIODE
LF	LINEAR FEET/FOOT
LM	LUMEN
LRA	LOCKED ROTOR AMPS
LT	LIGHT
LTG	LIGHTING
LTNG	LIGHTNING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA TELEVISION SYSTEM
MAX	MAXIMUM
MC	MECHANICAL CONTRACTOR METAL-CLAD (CONDUIT)
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MFR	MANUFACTURER
MFS	MAIN FUSED DISCONNECT SWITCH
MH	MANHOLE
MIC	MICROPHONE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MM	MULTI MODE FIBER
MN	MIDNIGHT
MOA	MULTIOUTLET ASSEMBLY
MSBD	MAIN SWITCHBOARD
MT	MOUNT
MTR	MOTOR, MOTORIZED
MTS	MANUAL TRANSFER SWITCH
N	NEW DEVICES
NAC	NETWORK APPLIANCE CIRCUIT
PANEL	
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NCA	NETWORK CONTROL ANNUNCIATOR
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFDS	NON-FUSED SAFETY DISCONNECT SWITCH
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
NVR	NETWORK VIDEO RECORDER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OL	OVERLOAD
PA	PUBLIC ADDRESS
PB	PULL BOX OR PUSHBUTTON
PBPU	PREFABRICATED BEDSIDE PATIENT UNIT
PCB	POLYCHLORINATED BYPHENYL
PC	PHOTOELECTRIC CELL
PED	PEDESTAL
PEND	PENDANT
PF	POWER FACTOR
PH	PHASE
PIV	POST INDICATING VALVE
PNL	PANEL
POE	POWER-OVER-ETHERNET
PR	PAIR
PRI	PRIMARY
PROJ	PROJECTION
PROT	PROTECTION
PRV	POWER ROOF VENTILATOR
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE (CONDUIT)
PWR	POWER
QTY	QUANTITY
RCP	REFLECTED CEILING PLAN
RCPT	RECEPTACLE
REQD	REQUIRED
RGS	RIGID GALVANIZED STEEL
RM	ROOM
RMS	ROOT MEAN SQUARE
RTU	ROOF TOP UNIT
SC	SURFACE CONDUIT
SEC	SECONDARY
SF	SQUARE FEET/FOOT
SHT	SHEET
SI	INTERNATIONAL SYSTEM OF UNITS
SIM	SIMILAR
S/N	SOLID NEUTRAL
SPEC	SPECIFICATION
SPKR	SPEAKER
SP	SPARE
SRG	SURGE
SR	SURFACE RACEWAY
SS	STAINLESS STEEL
SSW	SELECTOR SWITCH
STD	STANDARD
SURF	SURFACE MOUNTED
SW	SWITCH
SWBD	SWITCHBOARD
SYM	SYMMETRICAL
SYS	SYSTEM
RX	REQUEST TO EXIT
SEP	SERVICE ENTRANCE PROTECTION
SLC	SIGNALING LINE CIRCUIT
SM	SINGLE MODE FIBER
TC	TIMECLOCK
TEL	TELEPHONE
TEL/DATA	TELEPHONE/DATA
TERM	TERMINAL
TGB	TELECOMM GROUND BUS BAR
TM	TELEMONITORING
TMGB	TELECOMM MAIN GROUND BUS BAR
TP	TWISTED PAIR
TPS	TWISTED PAIR SHIELDED
TR	TAMPER RESISTANT
TRN	TRANSFORMER
T-STAT	THERMOSTAT
TTB	TELEPHONE TERMINAL BOARD
TTC	TELEPHONE TERMINAL CABINET
TV	TELEVISION
TYP	TYPICAL
UC	UNDER COUNTER
UE	UNDERGROUND ELECTRICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITER'S LABORATORY
UNO	UNLESS NOTED OTHERWISE
UT	UNDERGROUND TELEPHONE
UTP	UNSHIELDED TWISTED PAIR
UTIL	UTILITY
UV	UNIT VENTILATOR OR ULTRAVIOLET
V	VOLT
VA	VOLT-AMPERES
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
W	WATT
W/	WITH
WH	WATER HEATER
W/O	WITHOUT
WAP	WIRELESS ACCESS POINT
WM	MANUFACTURERS ASSOCIATION
WP	WEATHERPROOF
NFDS	NON-FUSED SAFETY DISCONNECT SWITCH
OC	ON CENTER
OIT	OFFICE OF INFORMATION TECHNOLOGY
PACS	PHYSICAL ACCESS CONTROL SYSTEM
PAMN	PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEM
PB	PUSH BUTTON
PDU	RACK POWER DISTRIBUTION UNITS
POE	POWER OVER ETHERNET
PR	PAIR
UL	UNDERWRITERS LABORATORY
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
XFMR	TRANSFORMER
XFR	TRANSFER
∠	ANGLE
@	AT
Δ	DELTA
'	FEET
"	INCHES
#	NUMBER
Φ	PHASE
℄	CENTER LINE
PL	PLATE

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#	Revisions:	Date

CONSULTANTS:

COLORADO REG./STERED VANDEVENTER 0051332 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ELECTRICAL GENERAL NOTES, SYMBOL LEGENDS, AND ABBREVIATIONS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

Drawing Number: E-001

Dwg 1 of 11

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CABLES AND CONNECTORS COLOR LEGEND

DESCRIPTION ITEM	JACK	CABLE	PATCH CABLES	I.D.	NOTES
TELEPHONE	IVORY	IVORY	IVORY	T	4 PAIR CABLE
DATA/COMPUTER	BLUE	BLUE	BLUE	C	4 PAIR CABLE
DATA/COMPUTER	YELLOW	YELLOW	YELLOW	C	4 PAIR CABLE
WIRELESS ACCESS PONT	GREEN	GREEN	GREEN	WAP	4 PAIR CABLE
FIBER - MULTI-MODE	BLACK	AQUA	AQUA	FO	6/12/24/36
FIBER - SINGLE-MODE	IVORY	YELLOW	YELLOW	FO	6/12
SOUND SYSTEM	N/A	GREEN	N/A	SS	MULTI COLOR CONDUCTORS
NURSE CALL	N/A	YELLOW	N/A	NC	4 PAIR UTP
MATV	N/A	BLACK	N/A	MATV	COAX RG6
CCTV - IP	WHITE	WHITE	WHITE	CCTV	CCTV
PACS	N/A	GRAY	N/A	PACS	MULTI COLOR CONDUCTORS

TECHNOLOGY SYMBOL LEGEND

SYMBOL	HEIGHT	DESCRIPTION	
TN	18"	DATA OUTLET - N-4 PR UTP	(N - QUANTITY)
TN	48"	TELCO OUTLET - N-4 PR UTP	(N - QUANTITY)
W T	48"	WALL PHONE	
WAPN	CEILING	WIRELESS ACCESS POINT - N-4 PR UTP	(N - QUANTITY)
SWAPN	CEILING	SECURE WIRELESS ACCESS POINT - N-4 PR UTP	(N - QUANTITY)
	AS NOTED	TV OUTLET WALL MOUNTED	
PACS	6' TO TOP	PHYSICAL ACCESS CONTROL SYSTEM	
CR	48"	CARD READER (K - KEYPAD)	
EL	DOOR	ELECTRONIC LOCKING MECHANISM	
EP	DOOR	ELECTRONIC PANIC HARDWARE	
DC	DOOR	DOOR CONTACT	
RX	ABOVE DOOR	REQUEST FOR EXIT SENSOR	
DO	DOOR	DOOR OPERATOR	
	48"	HANDWAVE	
	48"	EMERGENCY EXIT BUTTON TO RELEASE DOOR (EEB)	
MD	88"	MOTION DETECTOR	
	54"	INTERCOM WITH CAMERA	
M	DESK	INTERCOM MASTER WITH PUSH TO RELEASE DOOR	
NCE	6' TO TOP	NURSE CALL EQUIPMENT CABINET	
	18"	NURSE CALL MASTER STATION/CONSOLE	
	HEADWALL	NURSE CALL PATIENT STATION WITH PILLOW SPEAKER (GET WELL) (1 - SINGLE, 2 - DUAL, V - VANDAL RESISTANT)	
	HEADWALL	NURSE CALL PATIENT STATION WITH CALL CORD. (1 - SINGLE, 2 - DUAL, V - VANDAL RESISTANT)	
	40",72"	NURSE CALL EMERGENCY STATION WITH PULL CORD AND AUDIO +40" AFF IN RESTROOM, +72" AFF IN SHOWER (V - VANDAL RESISTANT, PB - PUSH BUTTON)	
	HEADWALL /40"	NURSE CALL CODE BLUE STATION	
	CEILING	NURSE CALL DOME LIGHT (Z - ZONE LIGHT, V - VANDAL RESISTANT)	
	ABOVE DOOR	NURSE CALL DOME LIGHT	
	18"	NURSE CALL PATIENT BED INTERFACE RECEPTACLE	
	60"	NURSE CALL DUTY STATION	
	60"	NURSE CALL STAFF TERMINAL	
NW	CEILING	NURSE CALL WIRELESS ANTENNAS	
	CEILING	WIRELESS PENDANT	
M	48"	PATIENT STATION (PB - PUSH BUTTON, M - MICROPHONE, K -KEYED)	
	CEILING	CCTV DOME CAMERA FIXED	
	CEILING	CCTV DOME CAMERA PAN/TILT/ZOOM	
	FLOOR	FOUR POST OIT EQUIPMENT RACK	
	FLOOR	TWO POST OIT EQUIPMENT RACK	
	FLOOR	OIT EQUIPMENT CABINET	
MATV	6' TO TOP	MATV EQUIPMENT CABINET	
CCTV	FLOOR	CCTV EQUIPMENT CABINET	
	ABOVE CEILING	LADDER CABLE TRAY	
	18"	GROUND BUS	
	8"	4'x8'x3/4" FIRE RATED TTB	
	FLOOR	FLOOR BOX FOR DATA	
PR	48"	PATIENT ROAM ALERT ACCESS CONTROL KEYPAD	
L	CEILING	PATIENT ROAM ALERT ANTENNA	
S	CEILING	CEILING MOUNTED SPEAKERS	
S	96"	WALL MOUNTED SPEAKERS	
AOF	6' TO TOP	AREA OF REFUGE PANEL	
AOFA	6' TO TOP	AREA OF REFUGE ANNUNCIATION PANEL	
IC	48"	AREA OF REFUGE INTERCOM	
S	CEILING	AREA OF REFUGE STROBE LIGHT	
PB	48"	DURESS PANIC ALARM PUSH BUTTON	
DPP	6' TO TOP	DURESS PANIC ALARM PANEL	
	CEILING	TELEMETRY ANTENNA - 2-4 PR	
	CEILING	ROBOT PHARMACY ANTENNA - 1-4 PR	

ALL HEIGHTS ARE TO CENTER OF DEVICE UNLESS NOTED OTHERWISE.
ANY HEIGHTS INDICATED IN PLANS SHALL SUPERCEDE THOSE LISTED HERE.
SEE DRAWINGS FOR MORE INFORMATION.
NOTE: NOT ALL SYMBOLS ARE USED.

GENERAL TECHNOLOGY NOTES

1. PROVIDE COMMUNICATIONS DEVICES AND EQUIPMENT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, MANUFACTURER'S RECOMMENDED PROCEDURES, ALL APPLICABLE LOCAL AND STATE CODES, AMERICANS WITH DISABILITIES ACT, LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, BICSI STANDARDS, AND VA STANDARDS.
2. EXISTING DRAWINGS ARE KNOWN INFO FROM VA AND DURING SITE OBSERVATION AND SURVEY. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
3. PROVIDE ADDITIONAL SUPPORT FOR DEVICES AND EQUIPMENT WHERE BUILDING CONSTRUCTION IS NOT SUITABLE FOR DIRECT MOUNTING.
4. FIRESTOP, DRAFTSTOP, SMOKESTOP OR PROTECT ANNULAR SPACE AROUND PENETRATIONS THROUGH WALLS, PARTITIONS, FLOORS, CEILINGS, AND ROOF IN ACCORDANCE WITH REQUIREMENTS OF NFPA 70, UL LISTING REQUIREMENT AND APPLICABLE BUILDING CODES.
5. PROVIDE CABLING THAT COMPLIES WITH THE LATEST EDITION OF TELECOMMUNICATIONS DISTRIBUTION METHOD MANUAL AND ANSI/TIA/EIA PUBLICATIONS.
6. COMPLY WITH THE LATEST ANSI/TIA/EIA 758 AND 607B OR 607A - GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS IN COMMERCIAL BUILDING.
7. COMPLY WITH THE LATEST ANSI/TIA/EIA 568B - COMMERCIAL BUILDING TELECOMMUNICATIONS WIRING STANDARD.
8. COMPLY WITH THE LATEST ANSI/TIA/EIA 569B - COMMERCIAL BUILDING STANDARD FOR TELECOMMUNICATIONS PATHWAYS AND SPACES.
9. COMPLY WITH THE LATEST NFPA 70 NATIONAL ELECTRICAL CODE.
10. COMPLY WITH THE LATEST NFPA 99 HEALTHCARE FACILITIES CODE.
11. COMPLY WITH THE LATEST NFPA 101 LIFE SAFETY CODE.
12. COORDINATE WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
13. MANUFACTURER'S NAME AND MODEL NUMBER ARE GIVEN FOR DESCRIPTIVE PURPOSES, TO INDICATE A QUALITY STANDARD, AND ARE NOT INTENDED TO LIMIT PRODUCTS TO A PARTICULAR MANUFACTURER. PRODUCTS DEEMED EQUAL AND APPROVED BY THE COR WILL BE ACCEPTABLE. COMPLY WITH "BUY AMERICAN ACT".
14. MOUNTING HEIGHTS INDICATED ARE TO CENTER OF DEVICE, BOXES, OUTLET, OR EQUIPMENT UNLESS NOTED OTHERWISE.
15. PROVIDE RGS OR EMT CONDUIT UNLESS OTHERWISE NOTED.
16. PROVIDE MATERIALS, DEVICES, APPLIANCES AND EQUIPMENT LABEL LISTED BY APPROVED THIRD PARTY TESTING AGENCY.
17. NOTIFY COR REGARDING DISCREPANCY BETWEEN PLANS AND SPECIFICATIONS FOR CLARIFICATION. THE MORE STRINGENT OF THE THEM SHALL TAKE PRECEDENCE.
18. PROVIDE TIA/EIA CAT 6 COPPER OUTLETS AND CONNECTORS.
19. ALL WORK AREA OUTLETS SHALL BE 8 PIN, CAT 6 KEYSTONE JACK WIRED PER T568A OR T568B AS DIRECTED BY THE VA COR.
20. LABEL DEVICES IN ACCORDANCE WITH LATEST ANSI/TIA 606A OR 606B EDITION AS WELL AS THE STANDARDS SET FORTH BY THE VA HOSPITAL OIT.
21. PROVIDE A MINIMUM OF 12" CLEARANCE ABOVE THE CABLE TRAY PER TIA/EIA 569.B PARAGRAPH 4.5.6.2.
22. VA WILL CONDUCT A WAP SURVEY AND PROVIDE THE SURVEY TO THE CONTRACTOR. INSTALL CABLING AND EQUIPMENT IN ACCORDANCE WITH THE SURVEY. COORDINATE WITH COR/OIT.
23. ALL CABLING INSTALLED ABOVE CEILING SHALL BE PLENUM RATED.
24. MINIMUM CONDUIT SIZE TO BE USED IS 3/4".
25. DEVICES PLACE IN INTERCOMMUNICATION ROOM TO BE MOUNTED ON FIRE RETARDANT PLYWOOD.

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#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED JAV Jason A. Vanderbeek 0051332 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: TECHNOLOGY GENERAL NOTES, SYMBOL LEGENDS, AND ABBREVIATIONS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number E-002

Dwg 2 of 11

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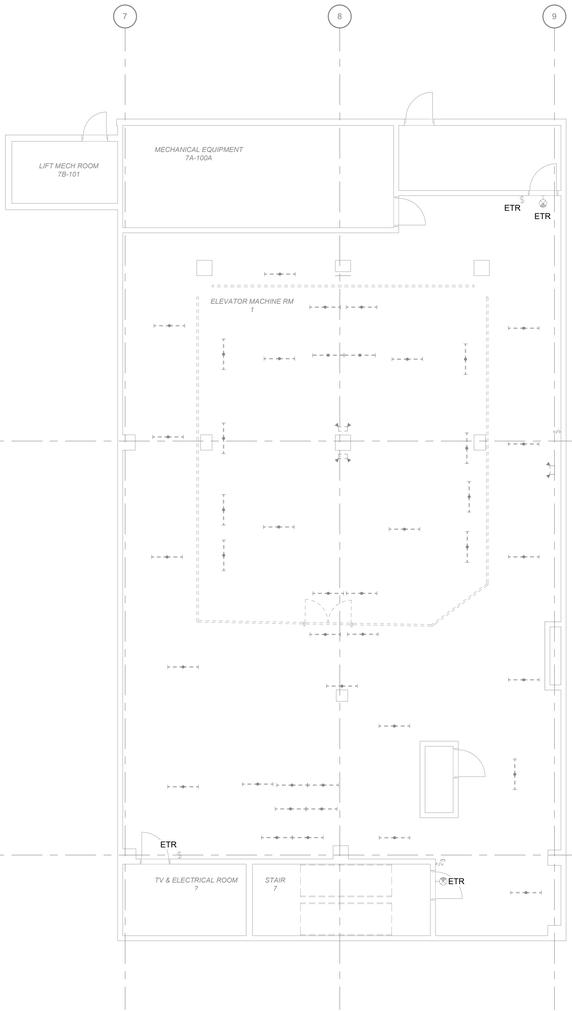
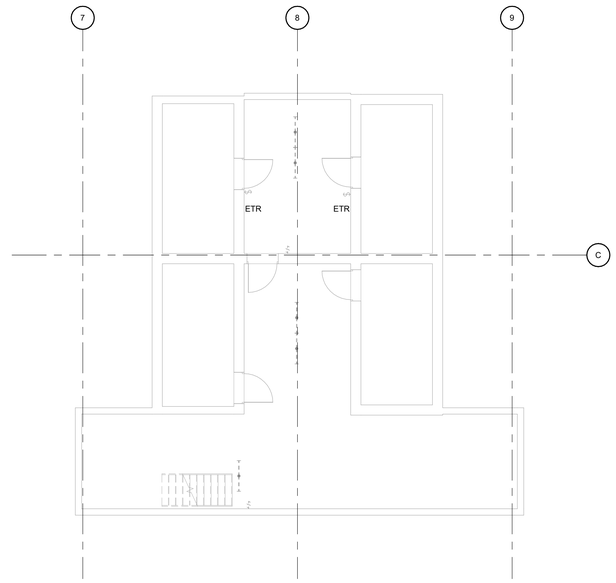
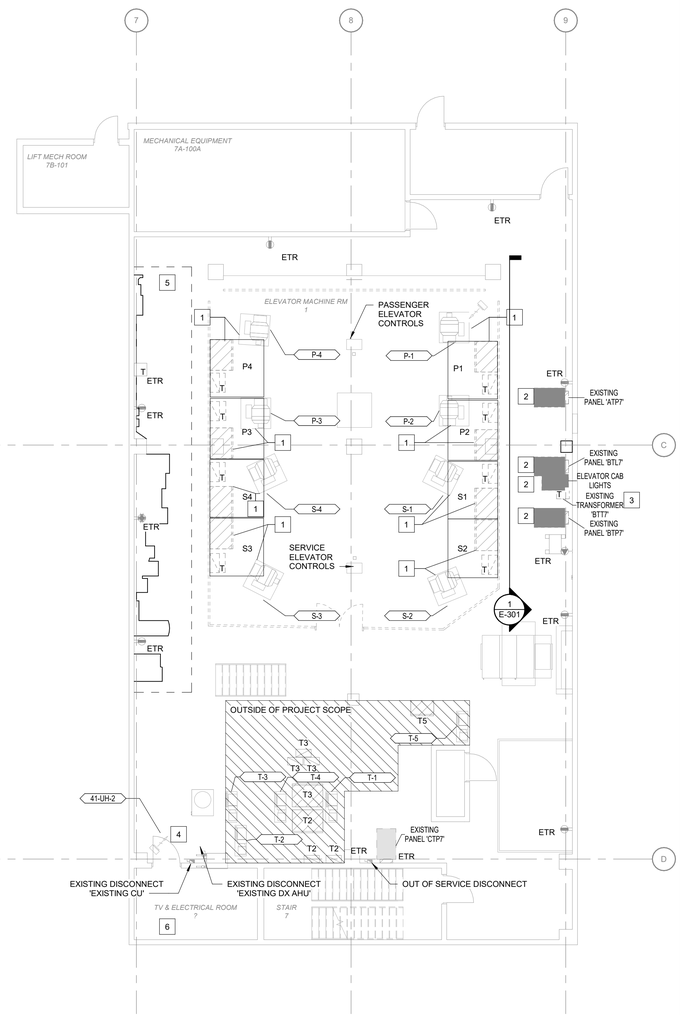


BUILDING 41 - ELEVATOR PENTHOUSE LIGHTING DEMOLITION PLAN
Scale: 1/8" = 1'-0"



BUILDING 41 - ELEVATOR INTERSTITIAL SPACE ELECTRICAL DEMOLITION PLAN
Scale: 1/8" = 1'-0"



BUILDING 41 - ELEVATOR PENTHOUSE ELECTRICAL EQUIPMENT DEMOLITION PLAN
Scale: 1/8" = 1'-0"

SHEET NOTES:

A. DEMOLISH ALL LIGHTING FIXTURES AND WIRING DEVICES SHOWN UNO, INCLUDING ASSOCIATED WIRING SYSTEMS.

B. ALL EXISTING ELECTRICAL PANELS AND DISCONNECTS SHALL REMAIN UNO.

C. TRACE AND IDENTIFY ALL CIRCUITS AND CONDUITS THAT ORIGINATE, PASS THROUGH, OR TERMINATE IN THE AREA OF WORK. MAINTAIN CIRCUIT CONTINUITY TO ALL CIRCUITS WHICH SERVE AREAS TO REMAIN ACTIVE.

D. FOR ELECTRICAL CIRCUITS BEING DEMOLISHED. REMOVE BOXES, CONDUIT, AND CONDUCTORS BACK TO SOURCE. INCLUDE THOSE CONCEALED WITH IN WALLS, LEAVING NO ABANDONED ITEMS.

E. PATCH/REPAIR LOCATIONS WHERE CONDUIT HAS BEEN REMOVED FROM AN EXISTING RATED ASSEMBLY NOT SUBJECT TO DEMOLITION TO MAINTAIN THE RATED ASSEMBLY.

KEY NOTES:

1 DISCONNECT AND REMOVE ELEVATOR FEEDER WIRING FROM PANELBOARD TO MOTOR, SEE SHEET E-107 FOR THE EXTENT OF DEMOLITION WORK. SEQUENCE WITH PROJECT PHASING REFER TO ARCHITECTURAL PHASING PLAN.

2 REPLACE EXISTING PANEL. SEE SHEET E-301 FOR EXTENT OF DEMOLITION WORK. SEQUENCE WITH PROJECT PHASING REFER TO ELECTRICAL PHASING PLAN ON E-001.

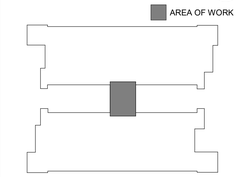
3 DISCONNECT AND REMOVE TRANSFORMER INCLUDE ASSOCIATED PRIMARY AND SECONDARY FEEDER WIRING.

4 DISCONNECT AND REMOVE THE EXISTING POWER AND CONTROL WIRING, ALONG WITH THE DISCONNECT SWITCHES FEEDING DX AHU AND CONDENSING UNIT. SEE SHEET MD107.

5 PROVIDE SOFT WALL/PLASTIC PARTITION AROUND EQUIPMENT DURING CONSTRUCTION, AND PROVIDE 3-#12 AWG, 1-#12 AWG EG IN ¾"C TEMPORARY CONDUCTORS AND CONNECT TO EXISTING PANEL 'CTP-7' FOR A TEMPORARY COOLING UNIT (SEE MECHANICAL M-107 FOR EQUIPMENT VOLAGE AND SIZING INFORMATION). SEE E-602 FOR CIRCUIT AND PANEL INFORMATION.

6 PROVIDE 3-#12 AWG, 1-#12 AWG EG IN ¾"C TEMPORARY CONDUCTORS AND CONNECT TO EXISTING PANEL 'CTP-7' FOR A TEMPORARY COOLING UNIT (SEE MECHANICAL M-107 FOR EQUIPMENT VOLAGE AND SIZING INFORMATION). SEE E-602 FOR CIRCUIT AND PANEL INFORMATION.

KEY PLAN
SCALE: NO SCALE



WALL RATING LEGEND

- 1 HR - FIRE SEPARATION
- 2 HR - FIRE SEPARATION
- SMOKE RESISTIVE HAZARDOUS AREA

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#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — VANCE J. ENGLE — 0051332 — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 ELEVATOR PENTHOUSE DEMOLITION PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

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Approved: Project Director

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Building Number # 41

Drawing Number ED107

Dwg 3 of 11

1/24/2023 11:38:56 AM

VA FORM 08-6231

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1 BLDG 41 BASEMENT FLOOR PLAN (C-WING)

Scale: 1" = 10'-0"

0 5 10 20

TRUE NORTH

SHEET NOTES:

A. ALL LIGHTING DEVICES AND ELECTRICAL EQUIPMENT TO BE NEW UNO.

B. SEQUENCE INSTALLATION OF NEW DEVICES/EQUIPMENT WITH PROJECT PHASING REFER TO ARCHITECTURAL PHASING PLAN.

(##) KEY NOTES:

1 NEW SUMP PUMP, DISCONNECT, AND CONTROLLER TO BE FED FROM EXISTING 120/208V EMERGENCY EQUIPMENT PANEL 'DTLB' FOUND IN ELECTRICAL ROOM BD-110C. COORDINATE WITH MECHANICAL CONTRACTOR FOR EQUIPMENT CIRCUITING AND CONTROL SETUP. SEE SHEET E-602 FOR FEEDER AND CONNECTION INFORMATION.

2 EXISTING T-4 FREIGHT ELEVATOR IS FED FROM EXISTING 277/480V PANEL 'CCPB'. PANEL IS LOCATED IN BC-110E ELECTRICAL ROOM. REFER TO E-602 FOR BREAKER AND BRANCH CIRCUIT WIRING.

3 LOCATION OF PANEL 'DTLB'.

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED JAVIER A. VALDEZ 0051332 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511

www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 QUADRANT C BASEMENT FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number E-100

Dwg 4 of 11

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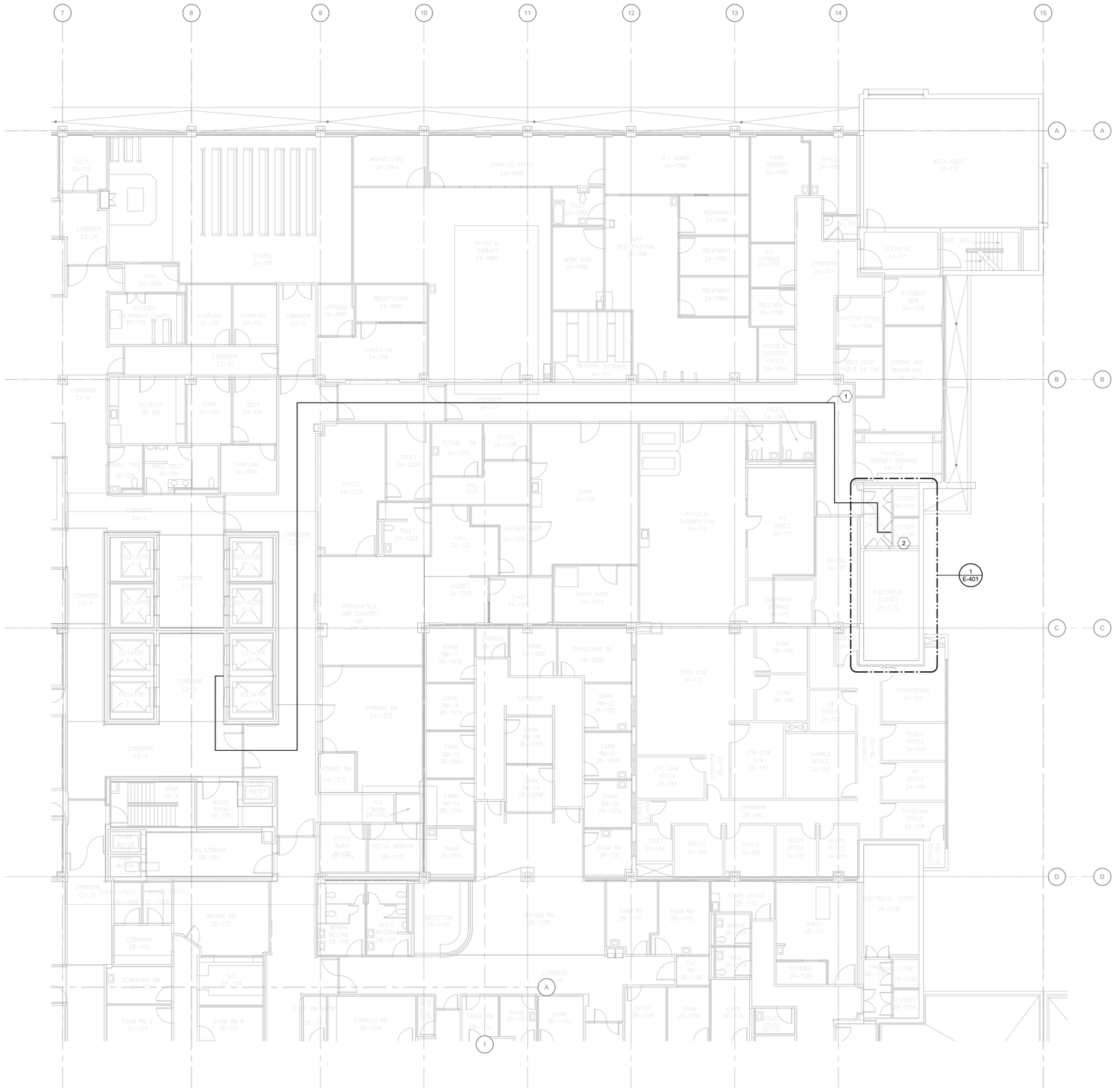

1 2ND FLOOR POWER PLAN

Scale: 1" = 10'-0"

0 5 10 20

TRUE NORTH

SHEET NOTES:

KEY NOTES:

1 PROVIDE DATA CABLING FOR CARD READERS FROM CONTROL PANEL.

2 PROVIDE iSTAR PRO DOOR CONTROLLER TO BE INSTALLED IN CLOSED 2A-117B. COORDINATE WITH MANUFACTURER (TYCO SOFTWARE HOUSE) FOR INSTALLATION.

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED 0051332 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 QUADRANT B 2ND FLOOR PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number E-102

Dwg 5 of 11

1/24/2023 11:38:54 AM

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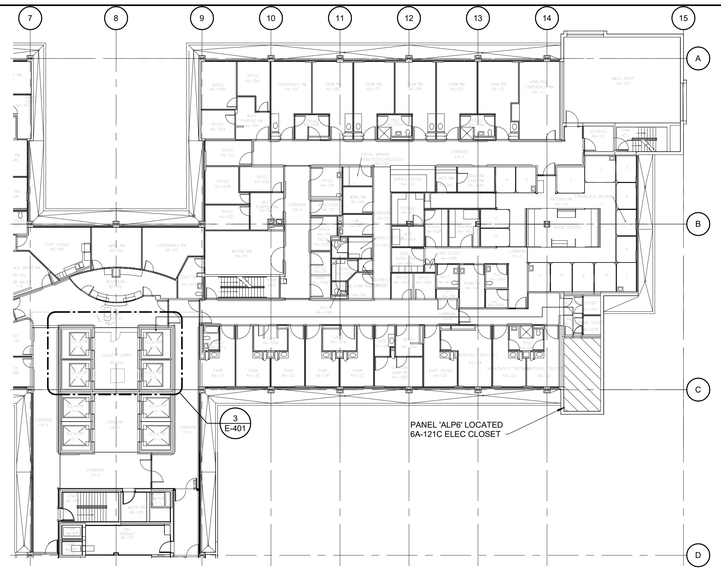
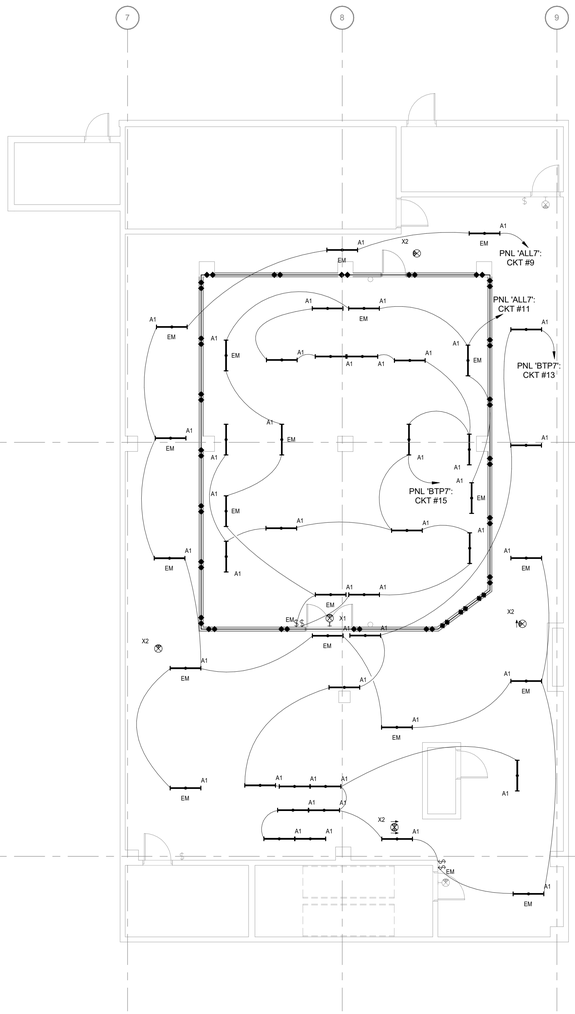


1 BLDG 41 A-WING 6TH FLOOR PLAN

Scale: 1" = 20'-0"

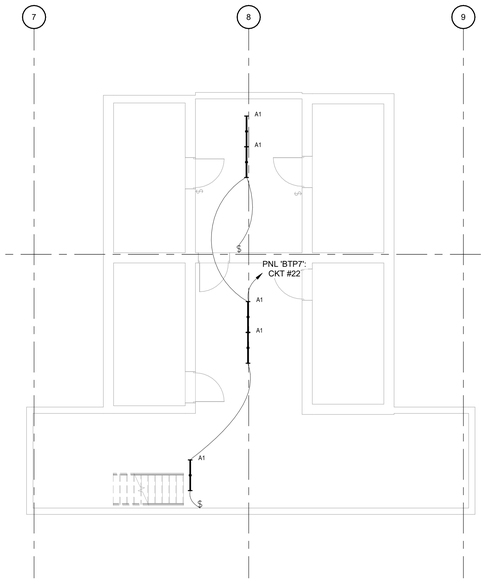
0 10 20 40 TRUE NORTH



4 BLDG 41 ELEVATOR PENTHOUSE LIGHTING PLAN

Scale: 1/8" = 1'-0"

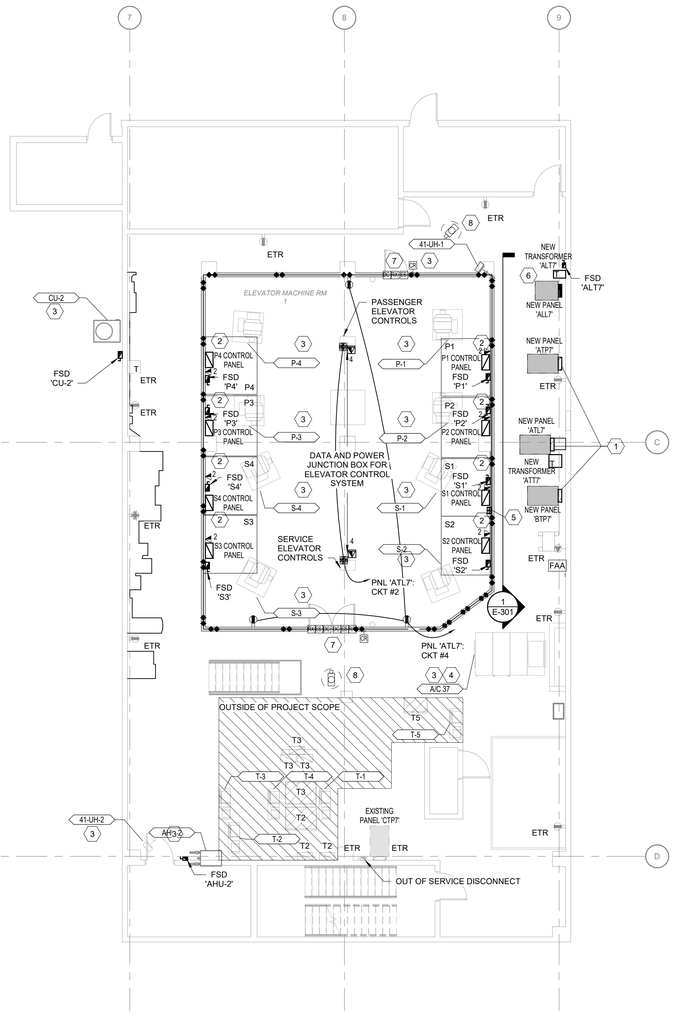
0 4 8 16 TRUE NORTH



3 BLDG 41 ELEVATOR INTERSTITIAL SPACE POWER PLAN

Scale: 1/8" = 1'-0"

0 4 8 16 TRUE NORTH



2 BLDG 41 ELEVATOR PENTHOUSE POWER PLAN

Scale: 1/8" = 1'-0"

0 4 8 16 TRUE NORTH

SHEET NOTES:

A. ALL LIGHTING DEVICES AND ELECTRICAL EQUIPMENT TO BE NEW UNO.

B. SEQUENCE INSTALLATION OF NEW DEVICES/EQUIPMENT WITH PROJECT PHASING REFER TO GENERAL PHASING PLAN ON SHEET G-100.

C. CIRCUIT ALL EXIT SIGNS TO CKT 13 TO PANEL 'ALL7'.

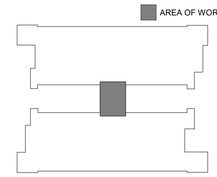
D. DATA DROPS TO ELEVATOR MACHINE ROOM TO BE PULLED FROM NEAREST, AVAILABLE SWITCH LOCATED ON THE 6TH FLOOR IT ROOM.

KEY NOTES:

1. REPLACE DISTRIBUTION EQUIPMENT SEE SINGLE-LINE ON SHEET E-601. SEQUENCE WITH PROJECT PHASING REFER TO ELECTRICAL PHASING PLAN ON E-001.
2. CONNECT ELEVATOR CONTROLLER TO DISCONNECT SWITCH.
3. CONNECT EQUIPMENT PER EQUIPMENT CONDUCTOR SCHEDULE SEE SHEET E-602
4. CONNECT EQUIPMENT TO EMERGENCY CIRCUIT.
5. PROVIDE PACS FOR S-1 ELEVATOR AND CONNECT TO EXISTING SYSTEM. SEE DETAIL 3 ON SHEET E-501.
6. PROVIDE NEW LIFE SAFETY PANEL (REFER TO SHEET E-602 FOR PANEL SCHEDULE AND SIZING) AND NEW WALL MOUNTED TRANSFORMER TO CONNECT TO EXISTING LIFE SAFETY PANEL 'ALP6' LOCATED IN ROOM 6A-121C. REFER TO E-601 SINGLE LINE FOR FEEDER CONNECTION AND SIZING INFORMATION.
7. PROVIDE NEW PACS DOOR DEVICES TO ELEVATOR MACHINE ROOM DOORS. PROVIDE (1) 12 AWG, (1) 12 AWG EG IN 3/4 C" FEEDER POWER CONNECTION FROM NEAREST 120/208V EMERGENCY PANEL, AND CAT 6E CABLE CONNECT TO NEAREST PACS CONTROLLER ON THE 6TH FLOOR. SEE E-501 FOR MORE INFORMATION ABOUT PACS DOOR DEVICES.
8. PROVIDE NEW MULTI-SENSOR SECURITY CAMERAS TO ELEVATOR MACHINE ROOM AND CONNECT TO NEAREST AVAILABLE CCTV RACK ON THE 6TH FLOOR.

KEY PLAN

SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED VANCE J. LAUSTEN 0051332 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 ELEVATOR PENTHOUSE POWER PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number E-107

Dwg 6 of 11

1/24/2023 11:38:00 AM

VA FORM 08-6231

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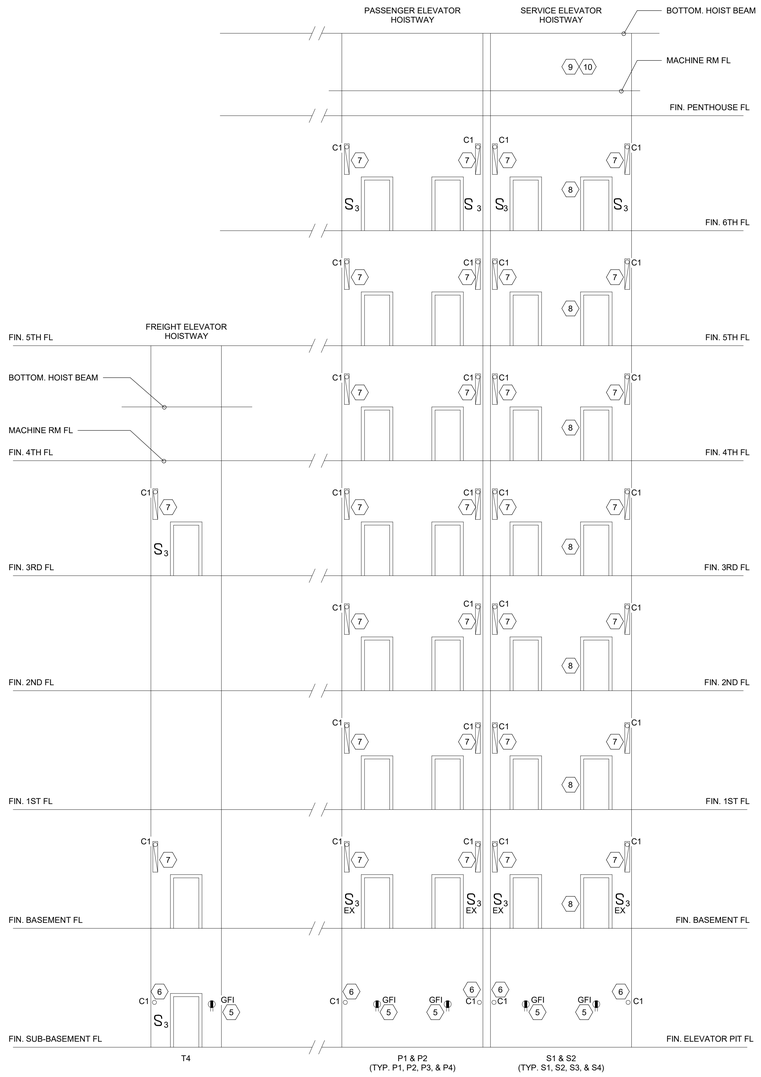
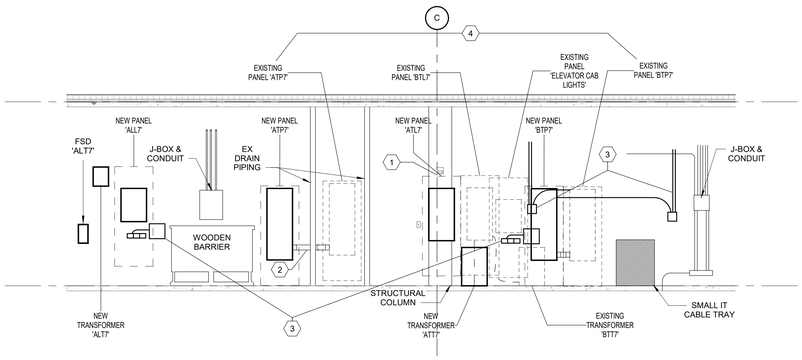


2 BLDG 41 PROJECT RELATED HOISTWAYS
Scale: N.T.S.



1 BLDG 41 ELEVATOR PENTHOUSE ELECTRICAL PANEL ELEVATION
Scale: 1/4" = 1'-0"

SHEET NOTES:

A. MACHINE ROOM LIGHTING SHALL NOT BE CONNECTED TO THE LOAD SIDE OF ANY GFI RECEPTACLE.
B. HOISTWAY AND PIT LIGHTING SHALL NOT BE CONNECTED TO THE LOAD SIDE OF ANY GFI DEVICE.

(##) KEY NOTES:

1 RELOCATE FIXTURE SEE SHEET T-107.
2 EXISTING VERTICAL PIPE TO REMAIN OFFSET CONDUIT TO AVOID CONFLICT.
3 RELOCATE JUNCTION BOX, CONDUITS, AND SWITCHES TO MATCH EXISTING CONDITIONS.
4 CONVERT EXISTING PANEL ENCLOSURE TO A JUNCTION BOX REPLACE PANEL COVER TO SHEET METAL COVERING.
5 REPLACE EXISTING CONVENIENCE OUTLET IN EACH ELEVATOR PIT WITH GFI TYPE. MAINTAIN EXISTING CIRCUITING.
6 REMOVE EXISTING PIT LIGHTS AND INSTALL TWO (2) TYPE C1 FIXTURES IN EACH ELEVATOR PIT CIRCUITED TO THE EXISTING CIRCUIT AND CONTROL.
7 REMOVE EXISTING HOISTWAY LIGHTING AND INSTALL ONE (1) TYPE C1 FIXTURE IN THE HOISTWAY FOR EACH ELEVATOR CAB, ON EACH LEVEL. COORDINATE LOCATION WITH ELEVATOR DESIGN MANUAL AND ELEVATOR CLEARANCES. MAINTAIN CIRCUITING.
8 PROVIDE PACS CARD READER ACCESSIBLE FROM THE ELEVATOR LOBBY FOR S-1.
9 PROVIDE PACS CONTROLLER NEXT TO S-1 ELEVATOR CONTROLLER SEE DETAIL 3 ON E-501.
10 PROVIDE PACS CARD READER INSIDE THE CAB OF THE ELEVATOR AND CONNECT TO PACS CONTROLLER VIA PACS TRAVELING CABLE. SEE DETAIL 3 ON SHEET E-501.

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED Paul Vaughn 0051332 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420
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ACG Project Number 19-262

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: ELECTRICAL HOISTWAY AND ELEVATIONS
Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41
Approved: Project Director
Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101
Building Number # 41
Drawing Number E-301
Dwg 7 of 11

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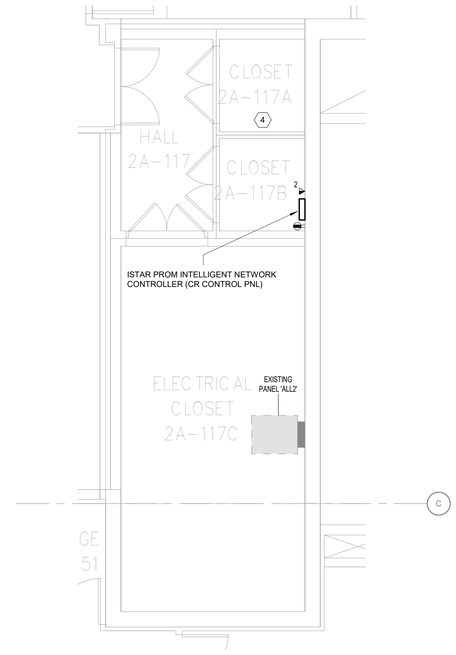
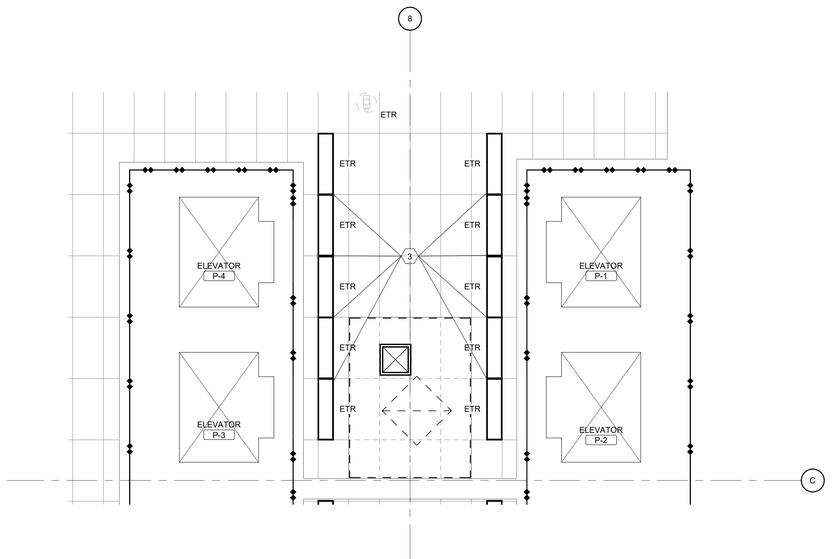
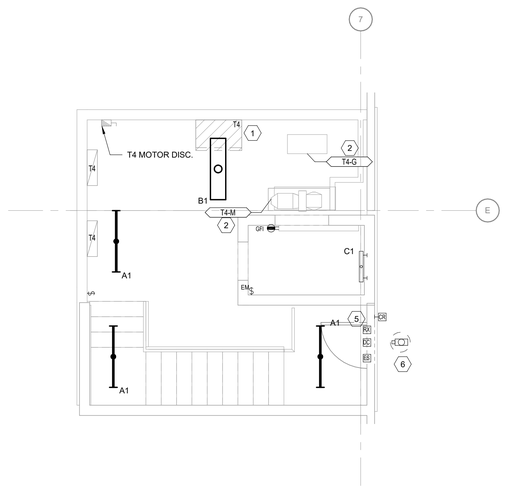


1 **BLDG 41 2ND FLOOR - CARD READER CONTROL PANEL ELECTRICAL WORK PLAN**
Scale: 1/4" = 1'-0"



3 **BLDG 41 6TH FLOOR - PASSANGER LOBBY ELECTRICAL WORK PLAN**
Scale: 1/4" = 1'-0"



2 **BLDG 41 SUB-BASEMENT - T4 ELEVATOR MACHINE ROOM 4C-142**
Scale: 1/4" = 1'-0"

SHEET NOTES:

A. ALL LIGHTING DEVICES AND ELECTRICAL EQUIPMENT TO BE NEW UNO.

B. SEQUENCE INSTALLATION OF NEW DEVICES/EQUIPMENT WITH PROJECT PHASING REFER TO ARCHITECTURAL PHASING PLAN.

(##) KEY NOTES:

1 DISCONNECT T4 FROM EXSITING CIRCUIT. SEE SHEET E-602 FOR FEEDER AND CONNECTION INFORMATION.
2 CONNECT EQUIPMENT PER EQUIPMENT CONDUCTOR SCHEDULE SEE SHEET E-602.
3 EXISTING LIGHTING FIXTURES MUST REMAIN ACTIVE DURING THE HOISTING OF THE ELEVATOR MOTORS AND EQUIPMENT TO THE ELEVATOR PENTHOUSE.
4 IT (TELEPHONE AND SIGNALS) CLOSET.
5 PROVIDE NEW PACS DOOR DEVICES TO ELEVATOR MACHINE ROOM DOORS. PROVIDE (1) 12 AWG, (1) 12 AWG EG IN 3/4 C" FEEDER POWER CONNECTION FROM NEAREST 120/208V EMERGENCY PANEL, AND CAT 6E CABLE CONNECT TO NEAREST PACS CONTROLLER. SEE E-501 FOR MORE INFORMATION ABOUT PACS DOOR DEVICES.
6 PROVIDE NEW MULTI-SENSOR SECURITY CAMERAS TO ELEVATOR MACHINE ROOM AND CONNECT TO NEAREST AVAILABLE CCTV RACK.

FULLY SPRINKLERED
100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — JAVIER VARGAS — 0051332 — 1/24/2023

PROJECT MANAGER:

APOGEE Engineers | Architects
Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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ACG Project Number 19-262

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: ROOM DETAILS
Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108
Project Title: REPAIR-REPLACE ELEVATORS IN B-41
Approved: Project Director
Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101
Building Number # 41
Drawing Number E-401
Dwg 8 of 11

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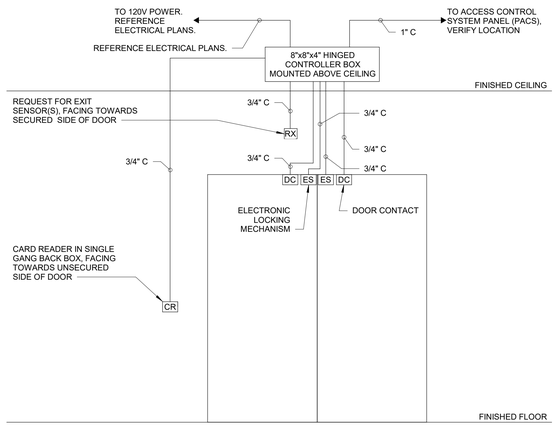


DETAIL NOTES:

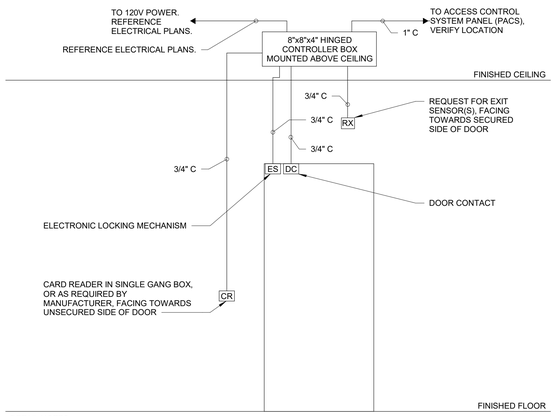
A. ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT, BOXES, AND SUPPORTS. COORDINATE AND VERIFY LOCATIONS WITH OWNER.

B. PROVIDE CABLING PER MANUFACTURER'S RECOMMENDATION.

C. COORDINATE PER ARCHITECTURAL PLANS & DOOR HARDWARE SCHEDULE. INDICATED AS GENERAL. PROVIDE AS INDICATED ON PLANS

5 DOUBLE DOOR CARD ACCESS - PANIC HARDWARE

Scale: N.T.S.



DETAIL NOTES:

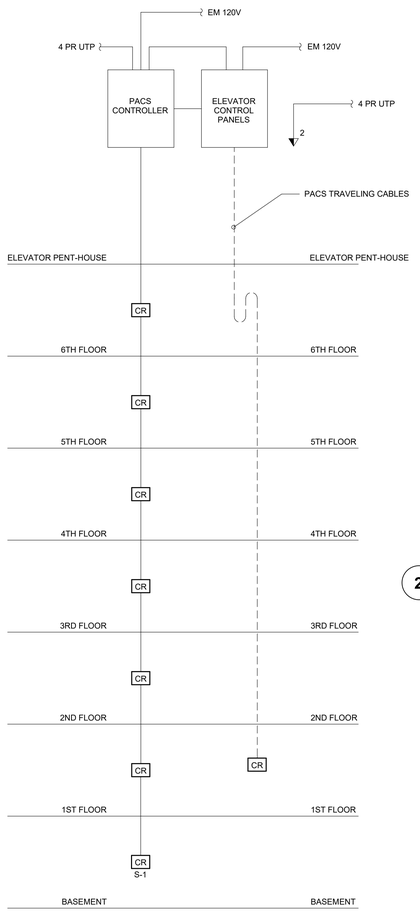
A. ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT, BOXES, AND SUPPORTS. COORDINATE AND VERIFY LOCATIONS WITH OWNER.

B. PROVIDE CABLING PER MANUFACTURER'S RECOMMENDATION.

C. COORDINATE PER ARCHITECTURAL PLANS & DOOR HARDWARE SCHEDULE. INDICATED AS GENERAL. PROVIDE AS INDICATED ON PLANS

6 SINGLE DOOR CARD ACCESS - PANIC HARDWARE

Scale: N.T.S.



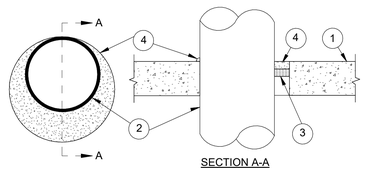
NOTES:

1. PROVIDE 6 CONDUCTOR CARD READER CABLE IN CONDUIT FOR EACH CARD READER.
2. SIZE ELECTRICAL CONDUIT FOR CARD READERS FROM THE PACS CONTROLLER TO MEET CODE.
3. COORDINATE WORK WITH ELEVATOR VENDOR/CONTRACTOR.
4. PROVIDE NEW CARD READER IN EACH ELEVATOR CAR, COORDINATE TRAVEL CABLING WITH ELEVATOR VENDOR/CONTRACTOR.
5. PROVIDE 2-4 PR UTP IN 3/4" CONDUIT FROM EACH ELEVATOR CONTROL PANEL TO IT ROOM ON 6TH FLOOR. COORDINATE WITH COR.

4 PACS RISER

Scale: N.T.S.

System No. C-AJ-1001
June 15, 2005
F Rating - 3 Hr
T Rating - 0 Hr
W Rating - Class I (See Item 4)



SECTION A-A

1. FLOOR OR WALL ASSEMBLY - MIN 4-1/2 IN. (114 MM) THICK LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED **CONCRETE BLOCKS***. MAX DIAM OF CIRCULAR THROUGH OPENING IS 32-1/2 IN. (826 MM).

SEE **CONCRETE BLOCKS** (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

1A. STEEL SLEEVE (OPTIONAL, NOT SHOWN) - NOM 12 IN. (305 MM) DIAM (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE SLEEVE CAST INTO CONCRETE FLOOR OR WALL. SLEEVE TO BE FLUSH WITH OR PROJECT MAX 2 IN. (51MM) FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF WALL.

2. THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE, CONDUIT OR TUBING AND PERIPHERY OF OPENING SHALL BE MIN OF 0 IN. (0 MM)(POINT CONTACT) TO MAX 1-3/8 IN. (35 MM). PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

A. STEEL PIPE - NOM 30 IN. (762 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
A1. IRON PIPE - NOM 30 IN. (762 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
B. CONDUIT - NOM 6 IN. (152 MM) DIAM (OR SMALLER) RIGID STEEL CONDUIT.
C. CONDUIT - NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING.

3. PACKING MATERIAL - POLYETHYLENE BACKER ROD OR NOM 1 IN. (25 MM) THICKNESS OF TIGHTLY-PACKED CERAMIC (ALUMINA SILICA) FIBER BLANKET, MINERAL WOOL BATT OR GLASS FIBER INSULATION MATERIAL USED AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF SOLID CONCRETE OR CONCRETE BLOCK WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF CAULK FILL MATERIAL (ITEM 4). AS AN ALTERNATE WHEN MAX PIPE SIZE IS 10 IN. (254 MM) DIAM AND WHEN MAX ANNULAR SPACE IS 1 IN. (25 MM), A MIN 1 IN. (25 MM) THICKNESS OF TIGHTLY-PACKED CERAMIC FIBER BLANKET OR MINERAL WOOL BATT PACKING MATERIAL MAY BE RECESSED MIN 1/2 IN. (13 MM) FROM BOTTOM SURFACE OF FLOOR OR FROM EITHER SIDE OF SOLID CONCRETE WALL.

4. FILL,VOID OR CAVITY MATERIALS* - CAULK OR SEALANT - APPLIED TO FILL THE ANNULAR SPACE TO THE MIN THICKNESS SHOWN IN THE FOLLOWING TABLE:

MAX PIPE DIAM IN. (MM)	MAX ANNULAR SPACE IN. (MM)	PACKING MATL TYPE (a)	MIN. CAULK THKNS IN. (MM)
10 (254)	1 (25)	BR, CF, GF OR MW	1/2 (13) (b)
10 (254)	1 (25)	CF OR MW	1/2 (13) (c)
30 (762)	2-1/2 (64)	BR, CF, GF OR MW	1 (25) (b)

(A) BR = POLYETHYLENE BACKER ROD.
CF = CERAMIC FIBER BLANKET.
GF = GLASS FIBER INSULATION.
MW = MINERAL-WOOL BATT.
(B) CAULK INSTALLED FLUSH WITH TOP SURFACE OF FLOOR OR BOTH SURFACES OF WALL.
(C) CAULK INSTALLED FLUSH WITH BOTTOM SURFACE OF FLOOR OR ONE SURFACE OF SOLID (NON-CONCRETE BLOCK) WALL.

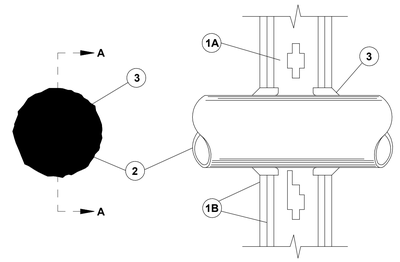
3M COMPANY - CP 25WB+ CAULK OR FB-3000 WT SEALANT.
(NOTE: W RATING APPLIES ONLY WHEN FB-3000 WT SEALANT IS USED.)

*BEARING THE UL CLASSIFICATION MARKING

2 UL PENETRATION DETAIL C-AJ-1001

Scale: N.T.S.

SYSTEM NO.W-L-1001
JUNE 15, 2005
F RATINGS - 1, 2, 3 AND 4 HR (SEE ITEMS 2 AND 3)
T RATINGS - 0, 1, 2, 3, AND 4 HR (SEE ITEM 3)
L RATING AT AMBIENT - LESS THAN 1 CFM/SQ FT
L RATING AT 400 F - LESS THAN 1 CFM/SQ FT



SECTION A-A

1. WALL ASSEMBLY - THE 1, 2, 3 OR 4 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED
OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGNS
IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS (MAX 2 HR FIRE RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC WITH
NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3-5/8 IN. (92 MM) WIDE BY 1-3/8 IN. (35 MM) DEEP CHANNELS SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD* - NOM 1/2 OR 5/8 IN. (13 OR 16 MM) THICK, 4 FT. (122 CM) WIDE WITH SQUARE OR TAPERED EDGES. THE
GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS
SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 26 IN. (660 MM).

2. THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE, CONDUIT OR TUBING AND PERIPHERY
OF OPENING SHALL BE MIN OF 0 IN. (0 MM) (POINT CONTACT) TO MAX 2 IN. (51 MM). PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
A. STEEL PIPE - NOM 24 IN. (610 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE - NOM 24 IN. (610 MM) DIAM (OR SMALLER) SERVICE WEIGHT (OR HEAVIER) CAST IRON SOIL PIPE, NOM 12 IN.
(305 MM) DIAM (OR SMALLER) OR CLASS 50 (OR HEAVIER) DUCTILE IRON PRESSURE PIPE.
C. CONDUIT - NOM 6 IN. (152 MM) DIAM (OR SMALLER) STEEL CONDUIT OR NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING
D. COPPER TUBING - NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING
E. COPPER PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
F. THROUGH PENETRATING PRODUCT* - FLEXIBLE METAL PIPING - THE FOLLOWING TYPES OF STEEL FLEXIBLE METAL GAS
PIPING MAY BE USED:

1. NOM 2 IN. (51 MM) DIAM (OR SMALLER) STEEL FLEXIBLE METAL GAS PIPING. PLASTIC COVERING ON PIPING MAY OR MAY NOT BE REMOVED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

OMEGA FLEX INC

2. NOM 1 IN. (25 MM) DIAM (OR SMALLER) STEEL FLEXIBLE METAL GAS PIPING. PLASTIC COVERING ON PIPING MAY OR MAY NOT BE REMOVED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

TITEFLEX CORP
A BUNDY CO

3. NOM 1 IN. (25 MM) DIAM (OR SMALLER) STEEL FLEXIBLE METAL GAS PIPING. PLASTIC COVERING ON PIPING MAY OR MAY NOT BE REMOVED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

WARD MFG INC

3. FILL,VOID OR CAVITY MATERIAL* - CAULK OR SEALANT - MIN 5/8. 1-1/4,1-7/8 AND 2-1/2 IN. (16, 32, 48 AND 64 MM) THICKNESS
OF CAULK FOR 1, 2, 3 AND 4 HR RATED ASSEMBLIES, RESPECTIVELY, APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES
OF WALL. MIN 1/4 IN. (6 MM) DIAM BEAD OF CAULK APPLIED TO GYPSUM BOARD/PENETRANT INTERFACE AT POINT CONTACT
LOCATION ON BOTH SIDES OF WALL.
THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE.
THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND
THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAX PIPE OR CONDUIT DIAM IN. (mm)	F RATING HR	T RATING HR
1 (25)	1 OR 2	0+, 1 OR 2
1 (25)	3 OR 4	3 OR 4
4 (102)	1 OR 2	0
6 (152)	3 OR 4	0
12 (305)	1 OR 2	0

+WHEN COPPER PIPE IS USED, T RATING IS 0 HR.

3M COMPANY - CP 25WB+ CAULK OR FB-3000 WT SEALANT,

*BEARING THE UL CLASSIFICATION MARKING

1 UL PENETRATION DETAIL W-L-1001

Scale: N.T.S.

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100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED VANESSA J. VANDERPOOL 0051332 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:
ACG Project Number 19-262

APOGEE Engineers | Architects
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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: ELECTRICAL DETAILS
Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41
Approved: Project Director
Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101
Building Number # 41
Drawing Number E-501
Dwg 9 of 11

1/24/2023 11:39:04 AM

VA FORM 08-6231

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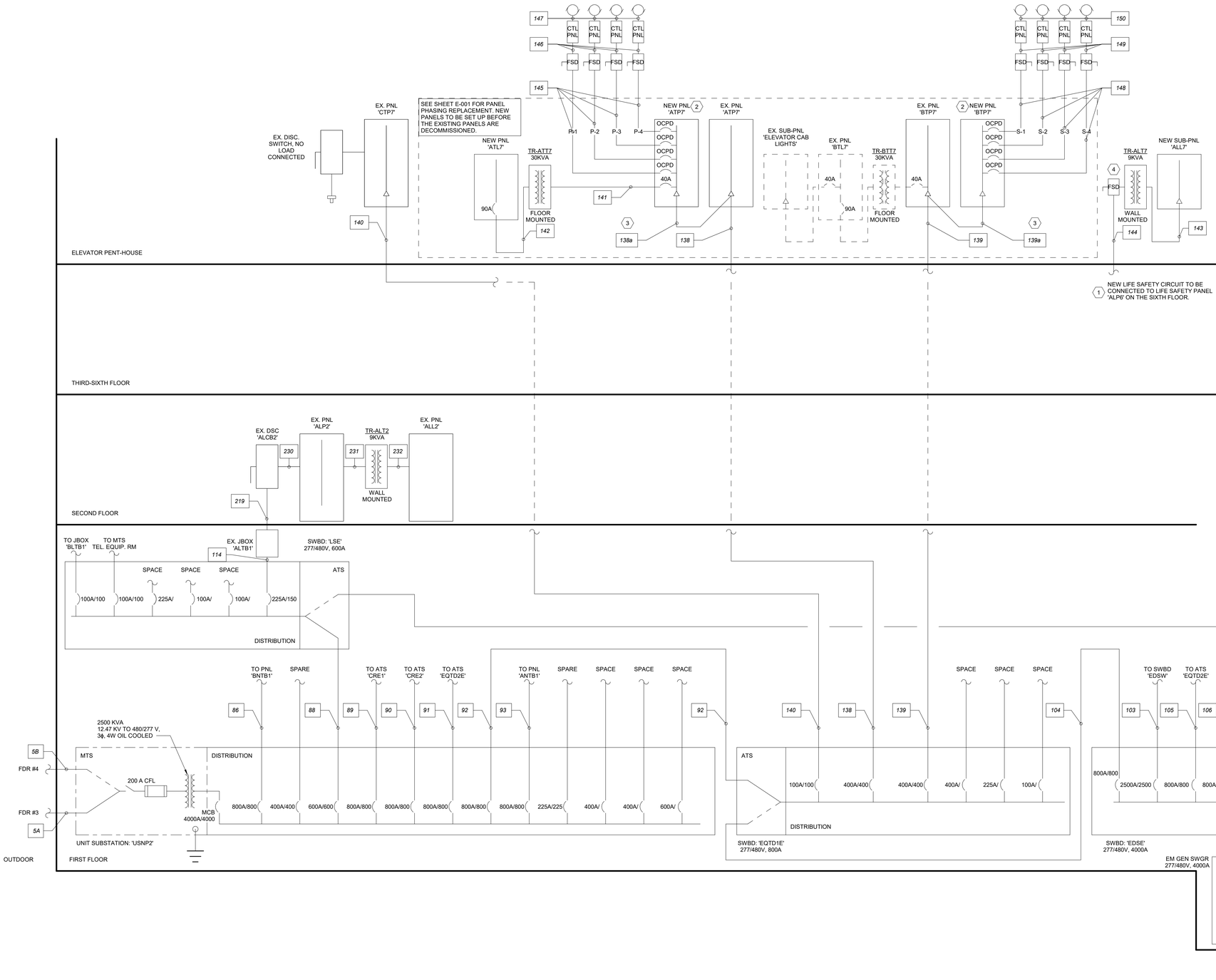

1 BLDG 41 ELEVATOR PENTHOUSE ONE-LINE DIAGRAM

Scale: N.T.S.

FEEDER SCHEDULE

FEEDER #	FEEDER DESCRIPTION
5A	(EXISTING)
5B	(EXISTING)
86	(EXISTING)
88	(EXISTING)
89	(EXISTING)
90	(EXISTING)
91	(EXISTING)
92	(EXISTING)
93	(EXISTING)
98	(EXISTING)
99	(EXISTING)
100	(EXISTING)
101	(EXISTING)
102	(EXISTING)
104	(EXISTING)
114	(EXISTING)
115	(EXISTING)
138	(4) #500, (1) #3 GND IN 3 1/2" C. (EXISTING)
138a	(4) #500, (1) #3 GND IN 3 1/2" C.
139	(4) #500, (1) #3 GND IN 3 1/2" C. (EXISTING)
139a	(4) #500, (1) #3 GND IN 3 1/2" C.
140	(3) #2, (1) #6 GND IN 1 1/2" C. (EXISTING)
141	(3) #8, (1) #10 GND IN 1" C
142	(4) #2, (1) #6 GND IN 1 1/2" C
143	(4) #6, (1) #8 GND IN 1" C
144	(3) #12, (1) #12 GND IN 3/4" C
145	SEE SHEET E-602 FOR FEEDER INFORMATION
146	SEE SHEET E-602 FOR FEEDER INFORMATION
147	SEE SHEET E-602 FOR FEEDER INFORMATION
148	SEE SHEET E-602 FOR FEEDER INFORMATION
149	SEE SHEET E-602 FOR FEEDER INFORMATION
150	SEE SHEET E-602 FOR FEEDER INFORMATION
219	(EXISTING)
230	(EXISTING)
231	(EXISTING)
232	(EXISTING)

SHEET NOTES:

A. ELEMENTS ON THE SHEET DO NOT REPRESENT THE LOCATION OF EQUIPMENT. REFER TO SHEET ED107, E-107, AND E-301 FOR MORE DIRECTION OF EQUIPMENT LOCATION.

(##) KEY NOTES:

1. PROVIDE 3P, 20A CIRCUIT BREAKER TO FEED ELEVATOR MACHINE ROOM LIFE SAFETY TRANSFORMER AND SUB PANEL. SEE SHEET E-107 FOR LOCATION OF FEEDER ON 6TH FLOOR.
2. SEE EQUIPMENT CONNECTION SCHEDULE ON SHEET E-602. FOR MOTOR OVER CURRENT REQUIREMENTS.
3. SPLICE AND EXTEND EXISTING FEEDER TO NEW PANEL LOCATION.
4. PROVIDE NEW 480V, 3P - 30A FRAME FUSE DISCONNECT SWITCH FUSED AT 20A.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — John Vanderhoff — 0051332 — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ONE-LINE DIAGRAMS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

Drawing Number: E-601

Dwg 10 of 11

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LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
P-1 CAB LIGHTS & ACCESSORIES	0.50	---	---	1P-20	1		2	1P-20	0.50	---	---	S-1 CAB LIGHTS & ACCESSORIES
P-2 CAB LIGHTS & ACCESSORIES	---	0.50	---	1P-20	3		4	1P-20	---	0.50	---	S-2 CAB LIGHTS & ACCESSORIES
P-3 CAB LIGHTS & ACCESSORIES	---	---	0.50	1P-20	5		6	1P-20	---	---	0.50	S-3 CAB LIGHTS & ACCESSORIES
P-4 CAB LIGHTS & ACCESSORIES	0.50	---	---	1P-20	7		8	1P-20	0.50	---	---	S-4 CAB LIGHTS & ACCESSORIES
PENTHOUSE EMERG. LTG	---	0.72	---	1P-20	9		10	1P-20	---	0.00	---	SPARE
PENTHOUSE EMERG. LTG	---	---	0.64	1P-20	11		12	1P-20	---	---	0.00	SPARE
PENTHOUSE EXIT LTG.	0.10	---	---	1P-20	13		14	1P-20	0.00	---	---	SPARE
SPARE	---	0.00	---	1P-20	15		16	1P-20	---	0.00	---	SPARE
SPARE	---	---	0.00	1P-20	17		18	1P-20	---	---	0.00	SPACE
SPACE	0.00	---	---	---	19		20	---	0.00	---	---	SPACE
SPACE	---	0.00	---	---	21		22	---	---	0.00	---	SPACE
SPACE	---	---	0.00	---	23		24	---	---	---	0.00	SPACE
SUB TOTAL	1.10	1.22	1.14						1.00	0.50	0.50	SUB TOTAL
									2.10	1.72	1.64	TOTAL

C/B TEMP. 75 C. RATING 120 208 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [X] YES [ ] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 10
MCB RATING 40A
BUS RATING 100A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS SHALL BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		2.10	1.72	1.64	125%	2.63	2.15	2.05
GENERAL USE RECEPT		0.00	0.00	0.00	<=10 KVA@100%	0.00	0.00	0.00
					>10KVA@50%	0.00	0.00	0.00
MOTORS AND EQUIPMENT	LARGEST	0.00	0.00	0.00	125%	0.00	0.00	0.00
	ALL OTHERS	0.00	0.00	0.00	100%	0.00	0.00	0.00
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT		0.00	0.00	0.00	100%	0.00	0.00	0.00
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL KV...		2.10	1.72	1.64		2.63	2.15	2.05
TOTAL DEMAND AMPERES PER PHASE						22	18	17
PANEL / FEEDER (TOTAL KVA)								6.83

PANEL 'ALL7'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 19

LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
-	2.50	---	---	2P-30	1		2	2P-20	1.66	---	---	BD-114
	---	2.50	---		3		4		---	1.66	---	
SPARE	---	---	0.00	1P-20	5		6	1P-20	---	---	0.00	SPARE
-	2.50	---	---	2P-30	7		8	2P-30	2.50	---	---	-
	---	2.50	---		9		10		---	2.50	---	
SPARE	---	---	0.00	1P-20	11		12	2P-30	---	---	2.50	RM-112
SPARE	0.00	---	---	2P-30	13		14		2.50	---	---	
	---	0.00	---		15		16	1P-30	---	0.00	---	SPARE
RO. SYSTEM	---	---	1.92	3P-20	17		18	**3P-15**	---	---	**0.41**	**SUMP PUMP (SP-1)**
	1.92	---	---		19		20		**0.41**	---	---	
	---	1.92	---		21		22		---	**0.41**	---	
SUMP PUMP (SP-4)	---	---	**0.41**	**3P-15**	23		24	**3P-15**	---	---	**0.41**	**SUMP PUMP (SP-2)**
	0.41	---	---		25		26		**0.41**	---	---	
	---	**0.41**	---		27		28		---	**0.41**	---	
SPACE	---	---			29		30	**3P-15**	---	---	**0.41**	**SUMP PUMP (SP-3)**
SPACE		---	---		31		32		**0.41**	---	---	
SPACE	---		---		33		34		---	**0.41**	---	
SPACE	---	---			35		36		---	---		SPACE
SPACE		---	---		37		38			---	---	SPACE
SPACE	---		---		39		40		---		---	SPACE
SPACE		---			41		42			---		SPACE
SUB TOTAL	7.33	7.33	2.33						7.89	5.39	3.73	SUB TOTAL
									15.22	12.72	6.06	TOTAL

C/B TEMP. 75 C. RATING 120 208 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [X] YES [ ] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 10
MCB RATING 125
BUS RATING 200A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS SHALL BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		0.00	0.00	0.00	125%	0.00	0.00	0.00
GENERAL USE RECEPT		0.00	0.00	0.00	<=10 KVA@100%	0.00	0.00	0.00
					>10KVA@50%	0.00	0.00	0.00
MOTORS AND EQUIPMENT	LARGEST	2.50	2.50	2.50	125%	3.13	3.13	3.13
	ALL OTHERS	12.72	10.22	3.56	100%	12.72	10.22	3.56
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT					100%	0.00	0.00	0.00
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL KV...		15.22	12.72	6.06		15.85	13.35	6.69
TOTAL DEMAND AMPERES PER PHASE						132.04	111.21	55.71
PANEL / FEEDER (TOTAL KVA)								35.88

EXISTING PANEL 'DTLB'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 100

EQUIPMENT CONNECTION SCHEDULE

TAG	PANEL SOURCE	LOCATION	DESCRIPTION	VOLTS	ϕ	RATING	OCP	CONDUCTORS		NEUTRAL	GROUND	CONDUIT	PLUG	DISCONNECT TYPE	FUSE RATING	REMARKS
S-1	BTP7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - SERVICE	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
S-2	BTP7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - SERVICE	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
S-3	BTP7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - SERVICE	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
S-4	BTP7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - SERVICE	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
P-1	APT7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - PASSANGER	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
P-2	APT7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - PASSANGER	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
P-3	APT7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - PASSANGER	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
P-4	APT7	BLDG 41 - PENTHOUSE	ELEVATOR MOTOR - PASSANGER	460V	3	40 HP / 52 A	100 A	3	3 AWG	N/A	8 AWG	(1) 1 1/4"	N/A	NEMA 1: 100 A, 3P	100 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
41-UH-1	BTL7	BLDG 41 - PENTHOUSE	FAN MOTOR	115V	1	1/60 HP / .65 A	20 A	2	12 AWG	N/A	12 AWG	(1) 3/4"	20A, 125V	N/A	N/A	N/A
41-UH-2	BTL7	BLDG 41 - PENTHOUSE	FAN MOTOR	115V	1	1/60 HP / .65 A	20 A	2	12 AWG	N/A	12 AWG	(1) 3/4"	20A, 125V	N/A	N/A	N/A
A/C 37	CPT7	BLDG 41 - PENTHOUSE	FAN MOTOR	460V	3	5 HP / 7 A	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	N/A
AHU-2	CPT7	BLDG 41 - PENTHOUSE	FAN MOTOR	208V	3	.75 HP / 1.5 A	15 A	2	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	N/A
CU-2	CPT7	BLDG 41 - PENTHOUSE	FAN MOTOR AND CONDENSING UNIT	460V	3	5 A	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 3R: 30 A, 3P	15 A	N/A
T-4	CCPB	BLDG 41 - SBC-100	ELEVATOR MOTOR - FREIGHT	460V	3	10 HP / 14 A	40 A	3	8 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 60A, 3P	40 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...
SP-1	DTLB	BLDG 41 - ELEV. PIT	PUMP MOTOR	208V	3	1.5 HP	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	FUSED SWITCH INTERGRAL WITH PUMP CONTROL PANEL
SP-2	DTLB	BLDG 41 - ELEV. PIT	PUMP MOTOR	208V	3	1.5 HP	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	FUSED SWITCH INTERGRAL WITH PUMP CONTROL PANEL
SP-3	DTLB	BLDG 41 - ELEV. PIT	PUMP MOTOR	208V	3	1.5 HP	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	FUSED SWITCH INTERGRAL WITH PUMP CONTROL PANEL
SP-4	DTLB	BLDG 41 - ELEV. PIT	PUMP MOTOR	208V	3	1.5 HP	15 A	3	12 AWG	N/A	12 AWG	(1) 3/4"	N/A	NEMA 1: 30 A, 3P	15 A	FUSED SWITCH INTERGRAL WITH PUMP CONTROL PANEL
E-1	DL	BLDG 10 - ELEV. RM	ELEVATOR MOTOR - HYDRAULIC	208V	3	10 HP / 32 A	60 A	3	6 AWG	N/A	8 AWG	(1) 1"	N/A	NEMA 1: 100 A, 3P	60 A	SHUNT-TRIP, CONTROL TRANSFORMER, AND SURGE...

THE ELECTRICAL CONTRACTOR SHALL VERIFY AND COORDINATE POWER REQUIREMENTS OF THE EQUIPMENT PROVIDED WITH THE MANUFACTURER/ CONTRACTOR AND SHALL PROVIDE ELECTRICAL SERVICES, FEEDERS, ETC. TO MATCH THE FURNISHED EQUIPMENT. CONTRACTOR SHALL PROVIDE FEEDERS/ CONDUCTORS SIZED TO ACCOUNT FOR VOLTAGE DROP IN ACCORDANCE WITH NEC 210.19.
'* DENOTES A TYPICAL ELECTRICAL CONNECTION FOR ALL UNITS ON PLANS WITH THE SAME TAG PREFIX.

LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
RECEPTACLE	1.20	---	---	1P-20	1		2	1P-20	0.10	---	---	RECEPTACLES - ELEV CNTR SYSM
SCT CAMERA POWER	---	1.60	---	1P-20	3		4	1P-20	---	0.54	---	RECEPTACLES - ELEV MACH RM
RECEPT SHAFT T-5	---	---	1.20	1P-20	5		6	1P-20	---	---	0.00	SPARE
RECEPT SECONDARY (ELEV. RM)	0.80	---	---	1P-20	7		8	1P-20	0.00	---	---	SPARE
S.T.	---	1.20	---	1P-20	9		10	1P-20	---	0.00	---	SPARE
HOISTWAY LIGHTS	---	---	1.20	1P-20	11		12	1P-20	---	---	0.00	SPARE
RECEPTACLE MATV TERM. BD	1.50	---	---	1P-20	13		14	1P-20	1.50	---	---	41-EG1
RECEPTACLE MATV TERM. BD	---	1.50	---	1P-20	15		16	1P-20	---	1.50	---	41 UH1 AND 41 UH2
RECEPTACLE MATV TERM. BD	---	---	1.50	1P-20	17		18	1P-20	---	---	1.20	RECEPTACLE WEST WALL
AIRCRAFT WARNING	1.20	-	---	1P-20	19		20	1P-20	1.20	---	---	RECEPTACLE WEST WALL
RECEPTACLE FOR SF37	---	1.00	---	1P-20	21		22	1P-20	---	1.20	---	RECEPTACLE WEST WALL
CONTACT PAGING	---	---	1.50	1P-20	23		24	1P-20	---	---	1.20	RECEPTACLE WEST WALL
PACS CONTOLLER	1.20	---	---	1P-20	25		26	1P-20	1.20	---	---	RECEPTACLE WEST WALL
SPACE	---	0.00	---		27		28	1P-20	---	1.20	---	RECEPTACLE WEST WALL
SPACE	---	---	0.00		29		30	1P-20	---	---	1.50	GLENAYRE WEST WALL
SPACE	0.00	---	---		31		32	1P-20	0.00	---	---	SPARE
SPACE	---	0.00	---		33		34	1P-20	---	0.00	---	SPARE
SPACE	---	---	0.00		35		36	1P-20	---	---	0.00	SPARE
SPACE	0.00	---	---		37		38	1P-20	0.00	---	---	SPARE
SPACE	---	0.00	---		39		40	1P-20	---	0.00	---	SPARE
SPACE	---	---	0.00		41		42	1P-20	---	---	0.00	SPARE
SUB TOTAL	5.90	5.30	5.40						3.90	3.90	3.90	SUB TOTAL
									9.80	9.20	9.30	TOTAL

C/B TEMP. 75 C. RATING 120 208 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [X] YES [ ] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 10
MCB RATING 100
BUS RATING 100A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS SHALL BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		1.25	1.25	0.00	125%	1.56	1.56	0.00
GENERAL USE RECEPT		2.40	2.40	2.40	<=10 KVA@100%	2.40	2.40	2.40
					>10KVA@50%	0.00	0.00	0.00
MOTORS AND EQUIPMENT	LARGEST	0.00	0.00	0.00	125%	0.00	0.00	0.00
	ALL OTHERS	0.00	0.00	0.00	100%	0.00	0.00	0.00
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT		5.90	5.80	6.90	100%	5.90	5.80	6.90
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL KV...		9.55	9.45	9.30		9.86	9.76	9.30
TOTAL DEMAND AMPERES PER PHASE						82.19	81.35	77.50
PANEL / FEEDER (TOTAL KVA)								28.93

PANEL 'ATL7'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 80

LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
TELEPHONE BOARD 2A-117a	1.92	---	---	1P-20	1		2	1P-20	1.92	---	---	PANEL RECPT.
UPS 2A-117a	---	1.92	---	1P-20	3		4	1P-20	---	1.92	---	**RECPT FOR NEW ISTAR CNTRL PNL**
SPARE	---	---	0.00	1P-20	5		6	1P-20	---	---	0.00	SPARE
SPACE	0.00	---	---		7		8		0.00	---	---	SPACE
SPACE	---	0.00	---		9		10		---	0.00	---	SPACE
SPACE	---	---	0.00		11		12		---	---	0.00	SPACE
SUB TOTAL	1.92	1.92	0.00						1.92	1.92	0.00	SUB TOTAL
									3.84	3.84	0.00	TOTAL

C/B TEMP. 75 C. RATING 120 208 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [X] YES [ ] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 10
MCB RATING 30A
BUS RATING 100A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS SHALL BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		0.00	0.00	0.00	125%	0.00	0.00	0.00
GENERAL USE RECEPT		3.84	3.84	0.00	<=10 KVA@100%	3.84	3.84	0.00
					>10KVA@50%	0.00	0.00	0.00
MOTORS AND EQUIPMENT	LARGEST	0.00	0.00	0.00	125%	0.00	0.00	0.00
	ALL OTHERS	0.00	0.00	0.00	100%	0.00	0.00	0.00
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT		0.00	0.00	0.00	100%	0.00	0.00	0.00
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL KV...		3.84	3.84	0.00		3.84	3.84	0.00
TOTAL DEMAND AMPERES PER PHASE						32	32	0
PANEL / FEEDER (TOTAL KVA)								7.68

PANEL 'ALL2'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 21

LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
	17.20	---	---		1		2		17.20	---	---	
PASSENGER ELEVATOR "P-1"	---	17.20	---	3P-100	3		4	3P-100	---	17.20	---	PASSENGER ELEVATOR "P-2"
	---	---	17.20		5		6		---	---	17.20	
	17.20	---	---		7		8		17.20	---	---	
PASSENGER ELEVATOR "P-3"	---	17.20	---	3P-100	9		10	3P-100	---	17.20	---	PASSENGER ELEVATOR "P-3"
	---	---	17.20		11		12		---	---	17.20	
	10.00	---	---		13		14		0.00	---	---	
TRANSFORMER "BTT7"	---	10.00	---	3P-50	15		16	3P-30	---	0.00	---	SPARE
	---	---	10.00		17		18		---	---	0.00	
	0.00	---	---		19		20		0.00	---	---	SPACE
SPARE	---	0.00	---	3P-50	21		22		---	0.00	---	SPACE
	---	---	0.00		23		24		---	---	0.00	SPACE
SPACE	0.00	---	---		25		26		0.00	---	---	SPACE
SPACE	---	0.00	---		27		28		---	0.00	---	SPACE
SPACE	---	---	0.00		29		30		---	---	0.00	SPACE
SUB TOTAL	44.40	44.40	44.40						34.40	34.40	34.40	SUB TOTAL
									78.80	78.80	78.80	TOTAL

C/B TEMP. 75 C. RATING 277 480 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [ ] YES [X] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 35
MCB RATING MLO
BUS RATING 400A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS MUST BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		0.00	0.00	0.00	125%	0.00	0.00	0.00
GENERAL USE RECEPT		7.00	6.50	6.70	<=10 KVA@100%	3.33	3.33	3.33
					>10KVA@50%	1.84	1.59	1.69
MOTORS AND EQUIPMENT		68.80	68.80	68.80	85%	58.48	58.48	58.48
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT		2.70	2.70	2.70	100%	2.70	2.70	2.70
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL KV...		78.50	78.00	78.20		66.35	66.10	66.20
TOTAL DEMAND AMPERES PER PHASE						239.51	238.61	238.97
PANEL / FEEDER (TOTAL KVA)								199

PANEL 'ATP7'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 239

LOAD SERVED	KVA / Phase A	KVA / Phase B	KVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	KVA / Phase A	KVA / Phase B	KVA / Phase C	LOAD SERVED
	17.20	---	---		1		2		17.20	---	---	
SERVICE ELEVATOR "S-1"	---	17.20	---	3P-100	3		4	3P-100	---	17.20	---	SERVICE ELEVATOR "S-2"
	---	---	17.20		5		6		---	---	17.20	
	17.20	---	---		7		8		17.20	---	---	
SERVICE ELEVATOR "S-3"	---	17.20	---	3P-100	9		10	3P-100	---	17.20	---	SERVICE ELEVATOR "S-4"
	---	---	17.20		11		12		---	---	17.20	
ELEV. PENTHOUSE LTG-OUT RM	1.70	---	---	1P-20	13		14		0.00	---	---	
ELEV. PENTHOUSE LTG-IN RM	---	1.30	---	1P-20	15		16	3P-30	---	0.00	---	SPARE
ELEV. SHAFT LIGHTING	---	---	1.60	1P-20	17		18		---	---	0.00	
	0.00	---	---		19		20		0.00	---	---	SPACE
SPARE	---	0.00	---	3P-50	21		22	1P-20	---	0.20	---	ELEV. INTER. LTG
	---	---	0.00		23		24		---	---	0.00	SPACE
SPACE	0.00	---	---		25		26		0.00	---	---	SPACE
SPACE	---	0.00	---		27		28		---	0.00	---	SPACE
SPACE	---	---	0.00		29		30		---	---	0.00	SPACE
SUB TOTAL	36.10	35.70	36.00						34.40	34.60	34.40	SUB TOTAL
									70.50	70.30	70.40	TOTAL

C/B TEMP. 75 C. RATING 277 480 V 3 PH 4 WIRE
MOUNTING SURFACE
ISOLATED GROUND BUS [ ] YES [X] NO
MAIN CIRCUIT BREAKER [ ] YES [X] NO
SERVICE ENTR. RATED [ ] YES [X] NO
MINIMUM AIC (K AMPS) 35
MCB RATING MLO
BUS RATING 400A
NEUTRAL RATING 100%

NOTE: ALL MOTOR CIRCUIT BREAKERS MUST BE HACR RATED.

LOAD TYPE		CONNECTED KVA A	CONNECTED KVA B	CONNECTED KVA C	NEC DEM FACTOR	DEMAND KVA A	DEMAND KVA B	DEMAND KVA C
GENERAL LIGHTING		1.70	1.50	1.60	125%	2.13	1.88	2.00
GENERAL USE RECEPT		0.00	0.00	0.00	<=10 KVA@100%	0.00	0.00	0.00
					>10KVA@50%	0.00	0.00	0.00
MOTORS AND EQUIPMENT		68.80	68.80	68.80	85%	58.48	58.48	58.48
WATER HEATERS		0.00	0.00	0.00	125%	0.00	0.00	0.00
FIX. ELEC. SPACE HEAT		0.00	0.00	0.00	100%	0.00	0.00	0.00
DEDICATED RECEPT		0.00	0.00	0.00	100%	0.00	0.00	0.00
SIGN		0.00	0.00	0.00	125%	0.00	0.00	0.00
TOTAL K...		70.50	70.30	70.40		60.61	60.36	60.48
TOTAL DEMAND AMPERES PER PHASE						218.79	217.89	218.34
PANEL / FEEDER (TOTAL KVA)								181

PANEL 'BTP7'

(TOTAL KVA) X 1000 = TOTAL AMPS
VOLTS X 1.732 218

LOAD SERVED	kVA / Phase A	kVA / Phase B	kVA / Phase C	CKT BRKR	CKT NO	NEUTRAL A B C	CKT NO	CKT BRKR	kVA / Phase A	kVA / Phase B	kVA / Phase C	LOAD SERVED
	0.00	---	--

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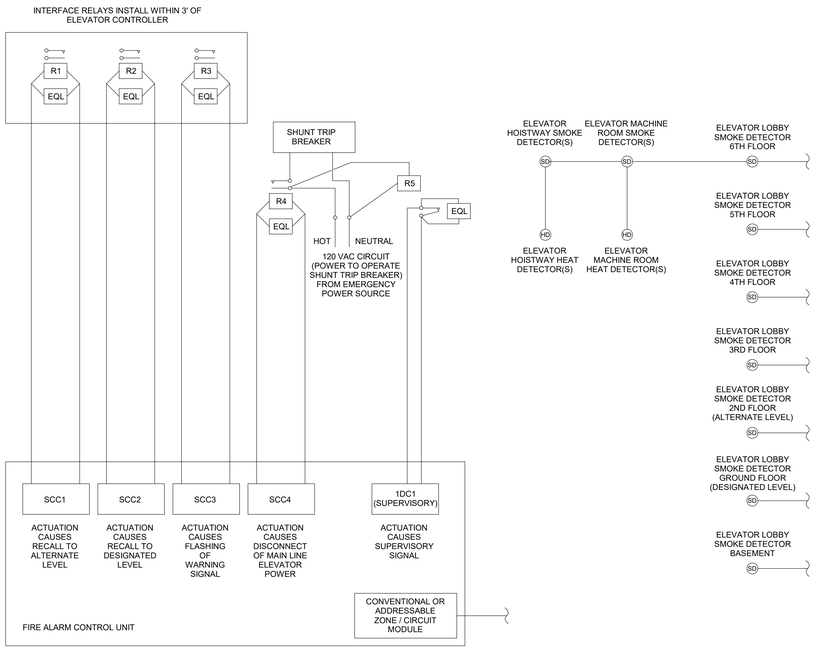
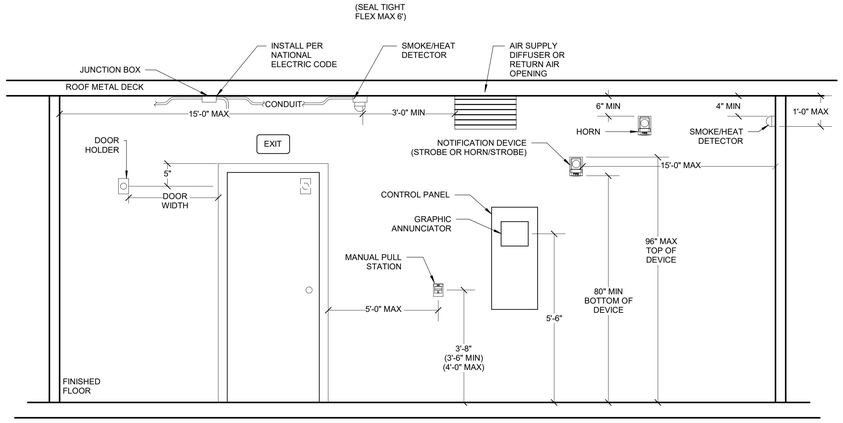


NOTE:
1. FIRE ALARM CIRCUITS ARE TO BE SIGNED AND INSTALLED IN ACCORDANCE WITH NFPA 72, NATIONAL FIRE ALARM CODE AND NEC 70, NATIONAL ELECTRICAL CODE

COMPONENT	FUNCTION
R1	SIGNAL TO ELEVATOR CONTROLLER FOR RECALL TO DESIGNATED LEVEL.
R2	SIGNAL TO ELEVATOR CONTROLLER TO RECALL TO ALTERNATE LEVEL
R3	SIGNAL TO ELEVATOR CONTROLLER FOR RECALL TO ALTERNATE LEVEL.
R4	SIGNAL TO ACTIVATE SHUNT TRIP RELAY.
R5	SUPERVISORY RELAY TO MONITOR PRESENCE OF VOLTAGE (POWER) TO OPERATE SHUNT TRIP BREAKER
SCC1	SUPERVISED CONTROL CIRCUIT FOR OPERATING R1.
SCC2	SUPERVISED CONTROL CIRCUIT FOR OPERATING R2.
SCC3	SUPERVISED CONTROL CIRCUIT FOR OPERATING R3.
SCC4	SUPERVISED CONTROL CIRCUIT FOR OPERATING R4.
IDC1	INITIATING DEVICE CIRCUIT TO SUPERVISE R5 CONTACTS (MONITORING POWER TO OPERATE SHUNT TRIP BREAKER).

3 FIRE ALARM INTERFACE WITH ELEVATORS

Scale: N.T.S.



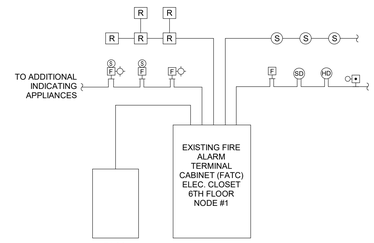
DETAIL NOTES:

A. MOUNT ALL AUDIBLE & VISUAL DEVICES IN APPROVED BOXES.

B. ALL ABOVE CEILING DEVICES TO BE MOUNTED IN ACCESSIBLE LOCATION.

1 FIRE ALARM DEVICE MOUNTING HEIGHTS

Scale: N.T.S.



NOTES:
1. FIRE ALARM SYSTEM SHALL BE INTERCONNECTED WITH ACCESS CONTROL SYSTEM TO ALLOW EGRESS DURING ALARM CONDITIONS. COORDINATE BETWEEN ACCESS CONTROL SYSTEM AND FIRE ALARM SYSTEM MANUFACTURERS.
2. ALL FIRE ALARM WIRING SHALL BE IN FACTORY PAINTED "RED" EMT CONDUIT.
3. ALL WIRING SHALL BE AS RECOMMENDED BY MANUFACTURER.
4. PROVIDE SEPARATE OUTPUT SIGNALS TO AIR HANDLER UNIT VFD FOR INDIVIDUAL UNIT SHUT-DOWN.
5. PROVIDE ELEVATOR RELAYS FOR EACH ELEVATOR.
   a. PRIMARY RECALL.
   b. ALTERATIVE RECALL.
   c. EMERGENCY SHUNT.
   d. EMERGENCY SHUNT POWER SUPERVISION.
   e. IN CAB NOTIFICATIONS/FIRE FIGHTER.
6. PROVIDE POWER AMPLIFIERS FOR ALL SPEAKERS.
7. THE NEW FIRE ALARM SYSTEM SHALL MATCH THE EXISTING SIMPLEX/TYCO FIRE ALARM SYSTEM

2 FIRE ALARM RISER

Scale: N.T.S.

FIRE ALARM SYMBOL LEGEND

SYMBOL	HEIGHT	DESCRIPTION	
F	42"-48"	FIRE ALARM PULL STATION	
S F	90"	FIRE ALARM SPEAKER	
F	90"	FIRE ALARM STROBE	XX - CANDELA
S F	90"	FIRE ALARM SPEAKER AND STROBE	XX - CANDELA XX - WATTAGE
	WALL	FIRE ALARM DOOR OPEN HOLDER	
SD	CEILING	FIRE ALARM PHOTOELECTRIC SMOKE DETECTOR	
S	CEILING	FIRE ALARM CEILING MOUNTED SPEAKER	
DD		FIRE ALARM DUCT SMOKE DETECTOR	
HD	CEILING	FIRE ALARM HEAT DETECTOR	
FACP	6'	FIRE ALARM CONTROL PANEL	
NAC	6'	FIRE ALARM NAC PANEL	
FAAP	6'	FIRE ALARM ANNUNCIATOR PANEL	
FAGAP	6'	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL	
		FLOW SWITCH	
		TAMPER SWITCH	
PIV		POST INDICATOR VALVE	
	6'	REMOTE LIGHT/TEST SWITCH FOR DUCT DETECTORS	
F	90"	FIRE ALARM BELL	
R	42"-48"	ELEVATOR RELAY CONTROL MODULE	

ALL HEIGHTS ARE TO CENTER OF DEVICE UNLESS NOTED OTHERWISE.
TOP: HEIGHT TO TOP OF DEVICE
ANY HEIGHTS INDICATED IN PLANS SHALL SUPERCEDE THOSE LISTED HERE.

FIRE ALARM ABBREVIATIONS LIST

AFF	ABOVE FINISH FLOOR
BOD	BASIS OF DESIGN
COR	CONTRACTING OFFICER REPRESENTATIVE
DN	DOWN
DVC	DIGITAL VOICE COMMAND
E	EXISTING DEVICES
ETR	EXISTING TO REMAIN
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FAGAP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL
FO	FIBER OPTIC
N	NEW DEVICES
NAC	NETWORK APPLIANCE CIRCUIT PANEL
NCA	NETWORK CONTROL ANNUNCIATOR
NS	NO SCALE
NTS	NOT TO SCALE
OC	ON CENTER
UL	UNDERWRITERS LABORATORY

GENERAL FIRE ALARM NOTES

1. PROVIDE FIRE ALARM SYSTEM AND COMPONENTS COMPLYING WITH THE LATEST:
   A. NFPA 13- STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS.
   B. NFPA 14- STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEM.
   C. NFPA 20- STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION.
   D. NFPA 70 NATIONAL ELECTRICAL CODE.
   E. NFPA 72 NATIONAL FIRE ALARM AND SIGNALING CODE.
   F. NFPA 90A STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS.
   G. NFPA 101 LIFE SAFETY CODE.
   H. VA FIRE PROTECTION DESIGN MANUAL.
   I. ANSI S3.41 AUDIBLE EMERGENCY EVACUATION SIGNAL.
2. FIRE ALARM SYSTEM SHALL COMPLY WITH FACTORY MUTUAL RESEARCH CORPORATION (FM).
3. PROVIDE FIRE ALARM WIRING IN CONDUIT, FACTORY PAINTED RED.
4. BEFORE STARTING WORK, TEST EXISTING FIRE ALARM SYSTEM IN WORK AREA AND ADJACENT AREAS.
5. NOTIFY COR REGARDING DEFICIENCIES AND NON-OPERATING COMPONENTS. VA WILL MAKE REPAIRS.
6. WHEN WORK IS COMPLETE, TEST EXISTING FIRE ALARM SYSTEM IN WORK AREA AND ADJACENT AREAS.
7. MAKE REPAIRS TO RESOLVE INCORRECT SYSTEM OPERATIONS AT NO ADDITIONAL COST.
8. THE FIRE ALARM SYSTEM VENDOR/CONTRACTOR SHALL TERMINATE, TEST AND PROGRAM ALL NEW FIRE ALARM DEVICES. COORDINATE WITH COR.
9. CONNECT SPRINKLER SYSTEM SUPERVISORY DEVICES TO THE FIRE ALARM SYSTEM. COORDINATE LOCATION WITH THE SPRINKLER CONTRACTOR.
10. CONNECT ALL ELECTROMAGNETIC DOOR HOLD OPEN DEVICES TO THE FIRE ALARM SYSTEM. COORDINATE WITH THE DOOR HARDWARE CONTRACTOR.
11. PROVIDE RELAY CONTROL MODULES FOR PACS, COORDINATE WITH PHYSICAL ACCESS CONTROL SYSTEM (PACS), CONTRACTOR AND COR.
12. PROVIDE RELAY CONTROL MODULES FOR COOKING POWER SUPPLY SHUT OFF.
13. PROVIDE RELAY CONTROL MODULES FOR KITCHEN HOOD FIRE SUPPRESSION SYSTEM.
14. THE OPERABLE PART OF A MANUAL ACTUATED ALARM INITIATING DEVICE SHALL BE NOT LESS THAN 42" (1.07M) AND NOT MORE THEN 48" (1.22M) FROM FINISH FLOOR.
15. FOR LOCATION (CORRIDOR, ROOM OR ADJACENT SPACE) WITH TWO OR MORE VISIBLE FIRE ALARM NOTIFICATION APPLIANCES WITHIN THE FIELD OF VIEW, PROGRAM VISIBLE TO FLASH IN SYNCHRONIZATION.

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED PROFESSIONAL ENGINEER — Paul Vanderslice — 0051332 — 1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA | U.S. Department of Veterans Affairs

Drawing Title: FIRE ALARM GENERAL NOTES, SYMBOL LEGEND, AND ABBREVIATIONS

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number FA001

Dwg 1 of 3

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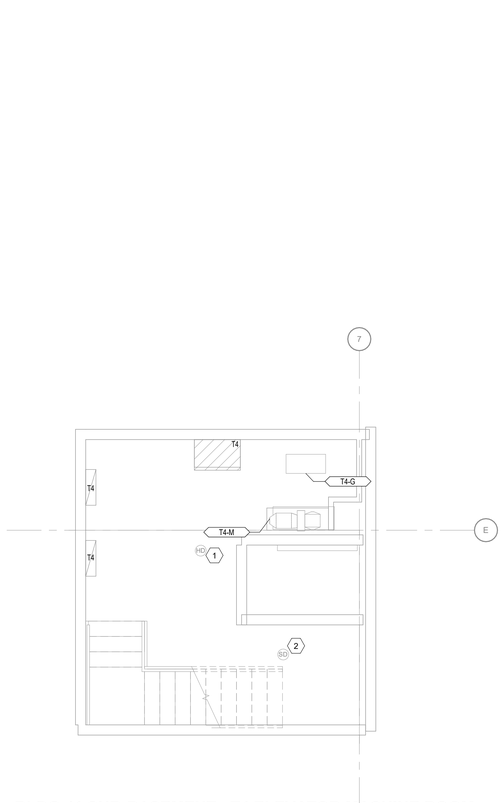
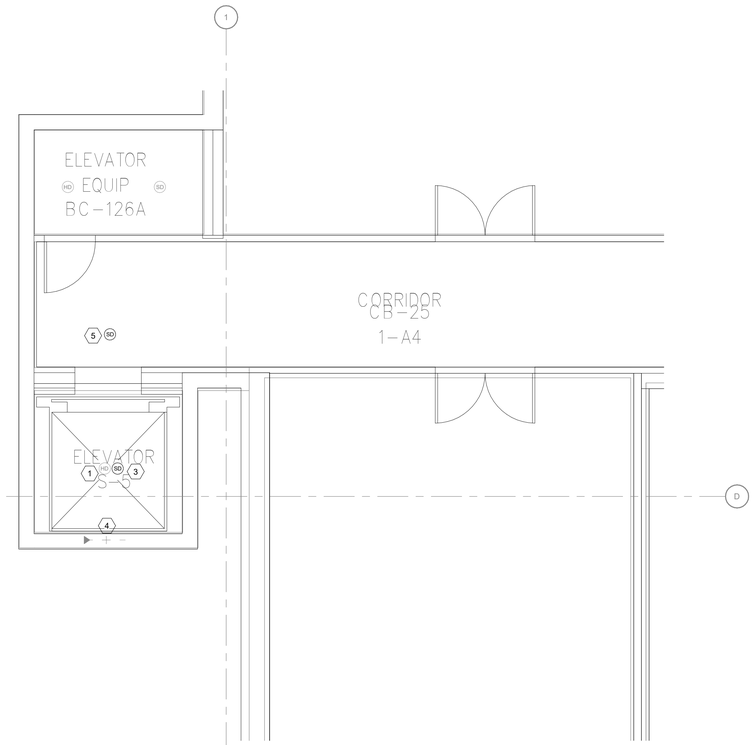


BLDG 41 SUB-BASEMENT - T4 ELEVATOR MACHINE ROOM 4C-142

2 **Scale: 1/4" = 1'-0"**



BLDG 41 FIRST FLOOR - S-5 ELEVATOR SHAFT FIRE ALARM PLAN

1 **Scale: 1/4" = 1'-0"**

SHEET NOTES:

KEY NOTES:

1 EXISTING HEAT DETECTOR TO BE PROTECTED DURING CONSTRUCTION. TEST AFTER CONSTRUCTION IN AREA HAS BEEN COMPLETED.

2 EXISTING SMOKE DETECTOR TO BE PROTECTED DURING CONSTRUCTION. TEST AFTER CONSTRUCTION IN AREA HAS BEEN COMPLETED.

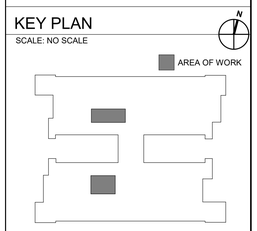
3 PROVIDE NEW SMOKE DETECTOR SIMPLEX (4098-9714 WITH 4098-9792 BASE, 4" OCTAGONAL BOX 2 ½" DEEP). CONNECT TO ADJACENT HEAT DETECTOR FIRE ALARM CIRCUIT.

4 CONTROLS CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR FOR LOUVER ACTUATOR CONNECTION TO HEAT DETECTOR AND SMOKE DETECTOR.

5 PROVIDE NEW CEILING MOUNTED SMOKE DETECTORS IN ELEVATOR LOBBYS AT EVERY FLOOR ELEVATOR OPENS TO. SMOKE DETECTORS TO BE CONNECTED TO NEW ELEVATOR FA RECALL SYSTEM.

KEY PLAN

SCALE: NO SCALE



WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED VANCE J. EDDY 0051332 PROFESSIONAL ENGINEER

1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

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Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511
www.acg-pa.com 919-858-7420

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: BLDG 41 ELEVATOR S-5 SHAFT FIRE ALARM PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

Project Title: REPAIR-REPLACE ELEVATORS IN B-41

VA PROJECT NUMBER: 501-19-101

Building Number: # 41

Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

Drawing Number: FA101

Dwg 2 of 3

1/24/2023 11:25:54 AM

VA FORM 08-6231

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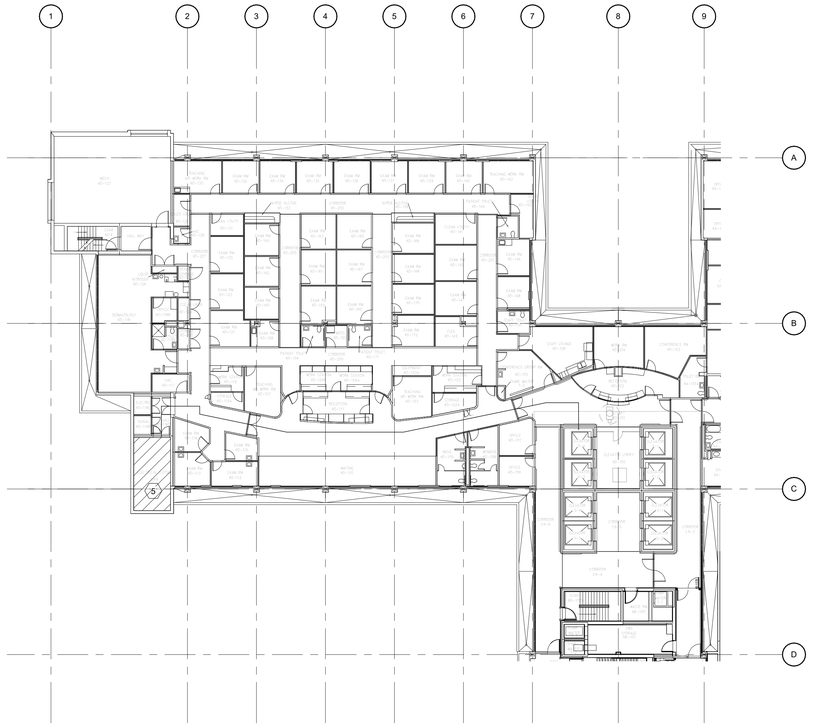
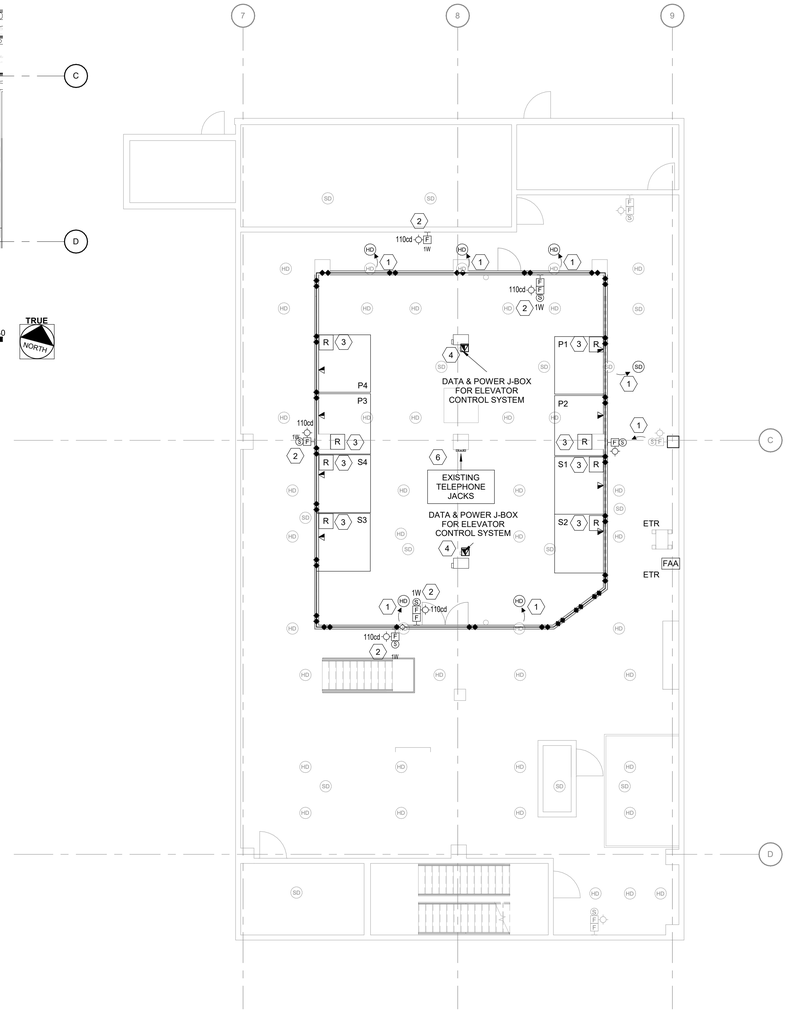


2 BLDG 41 D-WING 6TH FLOOR PLAN
Scale: 1" = 20'-0"

0 10 20 40

TRUE NORTH



1 BLDG 41 ELEVATOR PENTHOUSE FIRE ALARM PLAN
Scale: 1/8" = 1'-0"

0 4 8 16

TRUE NORTH

SHEET NOTES:

A. TRACE AND IDENTIFY ALL FIRE ALARM INITIATING AND NOTIFICATION CIRCUITS FOR CONNECTION OF NEW FIRE ALARM DEVICES AS SHOWN. MAINTAIN CIRCUIT CONTINUITY TO ALL CIRCUITS WHICH SERVE AREAS TO REMAIN ACTIVE.

B. PROTECT EXISTING DEVICES AND ASSOCIATED CIRCUITING.

C. PROVIDE SMOKE/FIRE PROTECTED SLEEVE RATED ASSEMBLIES FOR ALL WALL PENETRATIONS.

D. CONNECT EXISTING SMOKE DETECTORS IN ELEVATOR LOBBIES TO NEW ELEVATOR FA RECALL SYSTEM.

KEY NOTES:

1 RELOCATE EXISTING FA DEVICES AS SHOWN TEST AFTER RELOCATION.

2 CONNECT NEW DEVICE TO ADJACENT EXISTING FIRE ALARM CIRCUIT.

3 REPLACE ELEVATOR CONTROL RELAY AND CONNECT TO FIRE ALARM TERMINAL CABINET LOCATED IN ELECTRICAL CLOSET 116A ON THE 6TH FLOOR. SEE DETAIL 3/FA001.

4 EXISTING TELEPHONE CABLES AND JACKS SHALL BE REPLACED WITH NEW TELEPHONE CABLES (CAT 6A) AND NEW JACKS. EXTEND NEW TELEPHONE CABLING TO THE NEW ELEVATOR CONTROL PANELS. COORDINATE WORK WITH THE ELEVATOR CONTRACTOR.

5 PROVIDE ADDITIONAL TERMINATION POINTS FOR FIRE ALARM TERMINATION CABINET TO CONNECT NEW CONTROL WIRING FROM ELEVATOR DISCONNECT SWITCH.

6 EXISTING TELEPHONE JACKS AND CABLING TO BE REPLACED WITH NEW TELEPHONE JACKS AND CABLING. CONNECT TO THE NEW ELEVATOR CONTROLLER COORDINATE WITH COR.

KEY PLAN

SCALE: NO SCALE

N

AREA OF WORK

WALL RATING LEGEND

1 HR - FIRE SEPARATION

2 HR - FIRE SEPARATION

SMOKE RESISTIVE HAZARDOUS AREA

FULLY SPRINKLERED

100% BID DOCUMENTS

#	Revisions:	Date

CONSULTANTS:

COLORADO REGISTERED JAMES V. ANCHONDO 0051332 PROFESSIONAL ENGINEER
1/24/2023

PROJECT MANAGER:

ACG Project Number 19-262

APOGEE Engineers | Architects

Headquarters:
Apogee Consulting Group, P.A.
1151 Kildaire Farm Road, Suite 120
Cary, North Carolina 27511

www.acg-pa.com 919-858-7420

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Office of Construction and Facilities Management

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Drawing Title: BLDG 41 ELEVATOR PENTHOUSE FIRE ALARM PLAN

Location: 1501 SAN PEDRO DR SE, ALBUQUERQUE, NM 87108

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Approved: Project Director

Date: JANUARY 27, 2023 | Checked: JAV | Drawn: EFJ

VA PROJECT NUMBER 501-19-101

Building Number # 41

Drawing Number FA107

Dwg 3 of 3