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**SPECIFICATIONS
FOR DESIGN AND CONSTRUCTION
W9128F-23-R-0018**

**DISASTER RESILIENCY PROGRAM
BUILDING 631**

GRAND FORKS AFB, ND

MARCH 2023



**US Army Corps
of Engineers** ®
Omaha District

CUI

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**SPECIFICATIONS FOR DESIGN AND CONSTRUCTION OF
DISASTER RESILIENCY PROGRAM BUILDING 631**

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PART 1 GENERAL

1.1 REFERENCES

The design publications listed below shall be used as sources of criteria for the design. The most current edition of the code or standard (with errata and addenda) available at the RFP proposal submission deadline shall be used as criteria for the design - unless noted otherwise. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

INTELLIGENCE COMMUNITY STANDARD (ICS)

ICD 705	Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (IC Tech Spec - for ICD/ICS 705, Version 1.5.1, dated July 2021)
ICD/ICS 705	Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities
ICS 705-1	Physical and Technical Security Standard for Sensitive Compartmented Information Facilities
ICS 705-2	Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information

UNITED STATES AIR FORCE (USAF)

AFI 31-101	Integrated Defense
AFI 16-1404	Air Force Information Security Program
AFM 16-1406	National Industrial Security Program

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
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U.S. DEPARTMENT OF DEFENSE (DOD)

DODM 5200.01	DoD Information Security Program (Volumes 1-3)
DODM 5200.02	(Volume 2) DoD Information Security Program: Marking of Classified Information

DODM 5200.08	(Volume 3) Physical Security Program: Access to DoD Installations
DODM 5205.07	(Volume 3) DoD Special Access Program (SAP) Security Manual: Physical Security
UFC 4-010-05	Sensitive Compartmented Information Facilities Planning, Design, and Construction, with Change 1, dated 1 October 2013

1.2 DEFINITIONS

See the design drawings and specifications for descriptions of major components of work under this project to include, but not limited to "Secure Boundary", "secured area", Secured Work Area, and SWA.

1.2.1 Secure Area(s)

Areas identified in the design documents as "secure boundary" shall be designed, constructed, and accredited to the criteria listed below. The contractor shall design and construct the perimeter and all spaces within the boundary in compliance with the following criteria:

The listed criteria carries impacts to all building systems within the designated boundary. Use the most current version of the referenced criteria available at the bid submission deadline:

a. ICD/ICS 705 - Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities.

<https://www.dni.gov/files/Governance/IC-Tech-Specs-for-Const-and-Mgmt-of-SCIFs-v15>

b. ICS 705-1 - Physical and Technical Security Standards for Sensitive Compartmented Information Facilities.

c. ICS 705-2 - Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information.

d. UFC 4-010-05 - Sensitive Compartmented Information Facility Planning, Design and Construction.

e. DODM 5205.07 - DoD Special Access Program (SAP) Security Manual: Physical Security

The design drawings and specifications indicate the technical mitigations required by the project. This specification indicates the Contractor and Government's role(s) in administering the secure areas during construction for accreditation by assigned authorities.

1.2.2 Construction Secure Area Perimeter

The construction secured perimeter is a potentially moving boundary established during project construction by which the Site Security Officer (SSO) and Site Security Manager (SSM) assign layers of oversight for purposes of Construction Security Plan (CSP) implementation in compliance with ICD/ICS 705 and DODM 5205.07. This perimeter is established by a site perimeter fence (described below) early in construction process. Continuity of the secure area perimeter must be maintained by the Contractor (via a combination of temporary and/or permanent construction)

for the entirety of construction from CSP implementation through facility turnover. Coordinate the perimeter(s) and transitions from one CSP implementation perimeter to another with the SSM and with the anticipated order of construction, through the duration of the project.

At the contractor's option, the contractor may use Bldg. 631 to store materials for the secured portions of the building provided that the building boundary is properly secured. Also at the contractor's option, the contractor may consider all portions of the construction part of the secured area as the unsecured section is a relatively small portion of the overall building.

1.2.2.1 CSP and Secure Area Implementation

Oversight and administration of the secure area per ICD/ICS 705 and DODM 5205.07 is a Government-led function. This is managed on-site through the Government-assigned site security manager (SSM), who works through the Government-assigned site security officer (SSO) to document and report project compliance with ICD/ICS 705 to the appropriate accrediting official (AO) and/or accrediting agency. Requirements are documented in the project Construction Security Plan (CSP). The Contractor shall assume that they will only be provided with access to portions of the CSP documentation that relate to their role in the project, listed below. CSP implementation will occur within the constraints described herein:

- a. Grading, site work, and utility work outside the footprint of the buildings is not considered secure area work unless referenced otherwise - but may be captured within a secure perimeter depending upon individual contractor schedule, fenced/secured perimeters, and phasing of such work. Any work or materials within a secure area perimeter will be considered "secure area work" unless specifically isolated from the established perimeter(s).
- b. Contractor shall provide an Entry Access List (EAL) of all personnel, subcontractors, and suppliers. There will be two sign in logs, one for contractor personnel, one for site deliveries. Sign in logs will be kept on active file for 24 months. On the 25th month, they will be staged. Each contractor employee on the worksite will display identification as approved by the contracting officer (KO). The ID will be provided to the KO upon release of any employee. If required, the contractor will obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel will wear identifying markers on hard hats clearly identifying the company for whom the employee works.
- c. The SSM may coordinate ad-hoc inspections of the work during this phase.
- d. Access control is provided by manning a single door/gate at the construction secure area perimeter and verifying whether access is authorized via both a Government-managed badging/markings system and access roster. All materials intended to be installed within the project secured boundary area shall be stored within a lit, fenced perimeter on the project site or within the building. Fenced perimeter shall be a 6 foot tall metal fence with inserts to obscure visual observation of the site.

The Contractor shall provide a high security lock and keys by which to secure each perimeter at the end of each work day. The SSM shall be

provided with sole keyed access to any secure material storage area(s) and the SSM reserves the right to track entry and egress from the storage area(s). Secure area material storage areas will be secured by the SSM after the end of each work day and re-opened by the SSM each day.

Do not store equipment in a manner that would interfere with visual inspection of the secure area perimeter fence(s), unless specifically authorized in writing by the SSM and SFS.

e. The Contractor shall notify the Government NLT 30 Days in advance when they anticipate any features of work will be ready for access control to be established.

f. CSP implementation will only occur on the project once the Security and Site Access Management Plan (SSAMP) is approved and the secure area and secure area material storage perimeter(s) are constructed (by the Contractor) and secureable by the SSM. The contractor may perform work around and outside the secure area perimeter, but no construction that conceals a volume, void, or that transverses or penetrates the secure area perimeter/volume on the secure or unsecure side will be allowed without written approval by the Government. This would include ductwork, piping, conduit, and equipment that occurs within the secure perimeter walls, plenum, or within the secure space itself. These features may be routed to the perimeter of the secure area, but shall not penetrate that boundary until Government oversight is in place. CSP implementation will occur from that point through the entire duration of construction to include procurement and installation of any bid options.

g. Once the perimeter is coordinated and established, access to the facilities will be exclusively through the Government's access control procedures as defined herein. Any deviations from the procedures herein must be coordinated with USACE and the SSM in writing.

Contractor responsibilities associated with CSP implementation will only terminate upon full Government acceptance of all work on and within the secure area perimeter and upon the Contractor's departure from the project site - including procurement and installation of any bid options awarded under this contract. While it is the Contractor's responsibility to establish the order of work within the constraints established within this Contract, no work on or within the perimeter of the secure area shall occur without implementation of Government and Contractor responsibilities associated with the approved CSP - as described herein.

The Contractor shall document their intended order of work and required points of interface with CSP requirements in the Security and Site Access Management Plan as defined below - as well as reflect this requirement in the project schedule.

1.2.3 Security and Site Access Management Plan (SSAMP)

A detailed plan that acknowledges, describes, and details all unique access control, security, and phasing requirements in this Contract. Project-specific requirements for the SSAMP are described below.

1.2.4 US Persons

Individuals lawfully admitted for permanent residence as defined in U.S.C.

§ 1101(a)(20) or who is a protected individual as defined by Title 8 U.S.C. §1324b (a)(3)) shall be used for work on the secured work area (SWA).

Contractor will conduct initial vetting for workers using e-Verify to confirm all workers are US Citizens or US Persons and present a roster of all workers to the Site Security Manager (SSM, Government) who will verify using birth certificate, passport, or I-9 approved identification. Any additional workers added after the initial roster is submitted will not be allowed access until proper vetting has been completed, which may take up to 30 days. Validated construction workers will be added to the access control roster, issued an access badge/marking and receive a security briefing from the SSM. The security badge/marking shall be in the possession of the worker while on site and shall be required for access to any secure or controlled area. Security clearances, i.e. Secret, Top Secret, etc., are not required.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation 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

Project Security and Site Access Management Plan (SSAMP); G, RO

1.4 PROJECT SECURITY AND SITE ACCESS MANAGEMENT PLAN (SSAMP)

This project contains a variety of work under various security, access, and oversight requirements/limitations. It is the Government's intent that the Contractor perform all work under the fewest constraints allowable under the applicable criteria, and as applicable to the individual component of work.

Prior to the start of construction, the Contractor is to provide a Project SSAMP for approval by the Government. Clearly separate the plan into Secure Work Area (SWA) and non-SWA (if contractor chooses to separate the work) to address the following:

- a. List of primary and secondary Contractor POCs for Project security and access management.
- b. List of Contractors and Subcontractors requiring site access.
- c. Anticipated secure area and secure area material storage perimeter(s). Indicate any anticipated changes to the perimeters(s) during the duration of the project.
- d. Anticipated construction perimeter fence. Indicate any anticipated changes to the perimeters(s) during the duration of the project. Communicate a plan for continuity of secure area and secure area material storage perimeter(s) for the entirety of construction once CSP implementation has begun.
- e. Anticipated dates and durations of various work activities that will require Government oversight and/or coordination per the requirements in this Contract. The Contractor shall include provisions in their SSAMP that address and acknowledge the time, security, and oversight

constraints associated with constructing new facilities in compliance with ICD/ICS 705, this specification, and the CSP.

- f. Anticipated usage of temporary and/or permanent doors (with locks), barriers and similar at secure area perimeters, etc.
- g. CONTROLLED UNCLASSIFIED INFORMATION (CUI) document storage and handling procedures.
- h. Describe the technical approach to design and construction of the facility. Include considerations for management of both the "Secure Area" construction security (in accordance with UFC 4-010-05, ICD/ICS 705, DODM 5205.07, AFI 31-101, AFI 16-1404, AFM 16-1406, and DODM 5200.01.

The SSAMP shall serve as a living document that records the Contractor's approach for compliance with work restrictions documented herein. As Contractor requirements evolve, update the SSAMP for use and reference by the Government. Coordinate SSAMP updates with overarching construction schedule and "look-ahead" activities defined in 01 32 01.00 10 PROJECT SCHEDULE.

1.5 WORK RESTRICTIONS

The work shall conform to the following constraints:

- a. The Flightline Restricted Area (RA) and associated flightline activities will remain in operation during the entire construction period. The Contractor must conduct their operations so as to not cause interference with normal operations of RA activities including access to the control tower and the parking lots on the west side of the building.
- b. This project sits near an established Restricted Area. No work is anticipated within the established RA as part of this project.
- c. Permission to interrupt any roads or utility service must be requested in accordance with requirements listed in 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS.
- d. The Contractor is responsible for all labor, costs, and materials required to construct the entirety of the work described in this contract. For clarification, oversight and administration of the secure area per ICD/ICS 705 and DODM 5205.07 is a Government-led function. Comply with secure area oversight and administration requirements through the duration of the project.
- e. Contractor shall coordinate with the Site Security Manager (SSM) for photography of the Secure Area Perimeter walls, before drywall installation has occurred, as well as connections to underside of roof deck and any roof penetrations prior to be concealed by any other work. Pictures shall show that ICD/ICS 705 requirements have been met.

1.6 DOCUMENT CONTROL

All contract documents produced during design, including the design analysis, plans, and specification, shall be labeled as Controlled Unclassified Information (CUI). All contract documents on the construction site or at other locations shall be treated as CUI by the Contractor

regardless of labeling on the reference documents. The Contractor shall track and control access to the contract documents in compliance with AFI 16-1404 and DODM 5200.01. The Contractor shall log personnel and entities that have access to documents and hardcopies. Those logs shall be available to the Government for review and should include the entity and responsible party to which documents were issued.

Hardcopies of documents shall be stored within locked cabinets at the Designer of Record's office, within the secure area perimeter, or locked in the contractor's construction office when not in use and during non-work hours. Plans shall be returned to the Contractor as entities complete their work activities. Contractor shall destroy all hardcopy documents not turned over to the Government upon project completion.

Electronic data to include plans, drawings, and all other deliverables will be delivered on disc-based media to the USACE contracting officer. Distribution of the deliverables will be restricted to those approved on the contract CDRL list and devices used to house construction plans and documents will be placed on a control roster. The control roster will have the name of the contractor, type device and serial number of the device.

1.7 BASE ACCESS AND SECURITY

1.7.1 General

The US Army Corps of Engineers (USACE) in collaboration with Base Civil Engineering Squadron (CES) will coordinate installation and secure area entry with resource managers on Grand Forks Air Force Base (GFAFB). Base Security Forces Squadron (SFS), and will assist the Contractor with initiating security reviews (e.g. local and national agency checks) and requesting access and/or badges as described below. The Contractor shall furnish a list of Contractor personnel requiring entry to GFAFB and the secure area. This list will be provided as soon as possible, but not later than ten (10) days, after contract award and maintained current as Contractor personnel are added or dismissed from the contract/project. Contractor will be provided Entry Authority (EAL) instructions.

After initial acceptance of the list, submit changes and updates a minimum of 10 working days prior to the date of required access.

1.7.2 Base Hours

See 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS for base hours. Work outside those hours shall be coordinated with USACE and Security Forces Squadron per the requirements of this specification and 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS.

1.7.3 Scheduled and Unscheduled No Work Days

See 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS, for requirements relating to weather delays and federal holidays. Official snow call or late reporting may affect the Contractor's production for which the KO will not consider reimbursement for lost work time.

1.7.3.1 Operational Delays

The Contractor and their personnel shall leave Grand Forks Air Force Base (

GFAFB) immediately and safely upon notification by the Contracting Officer (KO), their technical representative, or constituted authority when directed, that operational requirements or emergencies dictate. Normal delay should not exceed one hour in duration.

1.7.3.2 Right to Deny Entry onto Base

The Installation Commander or designated representative reserves the right to deny entry to any Contractor whose National Agency Check is unfavorable, and the right to terminate the entry authorization of any Contractor employee upon disclosure of information which indicates the individual's continued entry to GFAFB is not in the best interest of national security. Additionally, the violation of or any deviation from established security procedures by the Contractor's employee may result in the confiscation of badges and the denial of future entry to GFAFB.

1.7.4 Base Entry Procedures and Airfield Security Requirements

1.7.4.1 Base Entry Procedures

Security requirements for Air Force facilities under control of Grand Forks Air Force Base are specific and rigidly enforced. Levels of security include Restricted and Controlled areas. Building 631 and the area for the Communications Hut are not restricted areas.

This site is near the airfield. It is not anticipated that the contractor will require access to the airfield. Should some circumstance require access to the airfield, the contractor shall coordinate access with the base CES. Questions of clarification on locations or procedures for controlled/restricted areas contact Security Forces at 701-747-5351.

Bldg. 629 is to the north of Bldg. 631 and any work affecting access to that building must be coordinated with CES.

1.7.4.2 Minimum Security Requirements

This includes all areas including base entry.

1.7.4.2.1 Visitor Passes

The Commercial Visitor Control Center will issue a SFS Form 74 (Visitor Pass) to the contractor and employees upon completion of screening process for the duration of the contact. The screening process takes time, and the contractor shall visit the Commercial Visitor Control Center prior to expecting base entry to receive required forms and instruction on the application process, to include estimated time of receiving the visitor pass.

1.7.4.2.2 Vehicles

Although contractors will not be issued vehicles passes, vehicles are subject to search while on the installation. Employee privately-owned vehicles will not be allowed access to restricted/controlled areas without a free zone being established. Company vehicles will be allowed access to restricted/controlled areas.

All Contractor vehicles shall have markings with the company name for quick identification of ownership and notification if they are involved in an incident.

1.7.4.3 Conduct Requirements

The contractor shall ensure that all contractor employees comply with all base traffic regulations and properly conduct themselves while on the base.

1.7.4.4 Antiterrorism Requirements

Eagle Eyes: Contractor will post OSI Eagle Eyes posters in the work area. Posters will be made available by the Installation AT Officer.

Training: Shift supervisors and/or Foreman will be required to attend Antiterrorism Level 1 training. Training will be provided by the Installation AT Officer or the Contracting Office.

See 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS for additional requirements.

1.8 SECURE AREA OVERSIGHT

1.8.1 Secure Area Access Control and Surveillance/Oversight

Secure area access control and surveillance oversight will occur on this project in order to assure CSP compliance through the entirety of the CSP implementation period as defined herein. Secure area access control and oversight will be conducted by Government personnel.

1.9 COMMUNICATIONS SECURITY (COMSEC) MONITORING

Contractor personnel are advised that any time they place a call or receive a call from a DoD organization, they are subject to COMSEC procedures, such as monitoring. All communications with DoD organizations are subject to COMSEC review. Telecommunications networks are continually subject to intercept by unfriendly intelligence organizations. The DoD has authorized the military departments to conduct COMSEC monitoring and recording of telephone calls originating from or termination of DoD organizations. The contractor is responsible for ensuring all contractor employees are informed of the provisions of this paragraph.

1.10 USE OF ELECTRONIC DEVICES

Cameras, cell phones, computers, radios and any other electronic devices with Bluetooth capability shall not be allowed in the construction secure area perimeter unless specific approval (with letter) is granted from SFS and SSM. Approval of any electronic devices is at the discretion of the Government.

The contractor shall request approval for such devices through the US Army Corps of Engineers (USACE) in collaboration with Base Civil Engineering Squadron and Base Security Forces Squadron, not less than 14 days in advance of required usage. Include approved devices in the approved equipment list. Personnel in possession of personal electronic devices such as cameras, laptops, etc. will have these devices and their serial numbers checked against the approved list to assure no unauthorized devices enter the construction sites. Additionally, log exit of site workers and personnel via badge scanning, marking verification, and/or access roster logging - precise procedures to be coordinated after construction contract award.

1.10.1 Secure Area Sign

Install a sign, minimum 20" x 30", stating the following: "ABSOLUTELY NO ELECTRONIC DEVICES PERMITTED BEYOND THIS POINT UNLESS APPROVED IN WRITING BY THE SITE SECURITY MANAGER" at the secure area access control point.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

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SECTION 01 30 00.24

OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS
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PART 1 GENERAL

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1.1 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

In accordance with FAR 31.105(d)(2)(i)(b), for the predetermined schedule of construction equipment use rates, use Engineer Pamphlet (EP) 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule. Copies of each regional schedule may be obtained through the following internet site:

<https://www.publications.usace.army.mil/USACE-Publications/Engineer-Pamphlets/>
on pages 10 and 11 of 13.

1.2 DESIGN-BUILD CONSTRUCTION CONTRACTS (MAR 2019)

(a) Design-Build Contract Order of Precedence. The contract includes the standard contract clauses and schedules current at the time of contract award. It entails (1) the Solicitation in its entirety, including all drawings, cuts, and illustrations, and any amendments, and (2) the successful offeror's accepted proposal. The contract constitutes and defines the entire agreement between the Contractor and the Government. No documentation shall be omitted which in any way bears upon the terms of that agreement.

(1) In the event of conflict or inconsistency between any portion of this contract, precedence shall be given in the following order:

i. Betterments: Any portions of the accepted proposal which both conform to and exceed the requirements of the Solicitation.

ii. The requirements of the Solicitation. (See also FAR 52.236-21, Specifications and Drawings for Construction)

iii. All other elements of the accepted proposal.

iv. Any design products including, but not limited to, plans, specifications, engineering studies and analyses, shop drawings, equipment installation drawings, etc. These are "deliverables" under the contract and are not part of the contract itself. Design products must conform to all provisions of the contract, in the order of precedence herein.

(b) Personnel, subcontractors, and outside associates or consultants. In connection with this contract, any in-house personnel, subcontractors, and outside associates or consultants will be limited to individuals or firms that were specifically identified in the Contractor's accepted proposal. The Contractor shall obtain the Contracting Officer's

written consent before making any substitution for these designated in-house personnel, subcontractors, associates, or consultants. If the Contractor proposes a substitution, it shall submit the same type of information that was submitted in the accepted proposal to the Contracting Officer for evaluation and approval. The level of qualifications and experience submitted in the accepted proposal or that required by the Solicitation, whichever is greater, is the minimum standard for any substitution.

(c) Responsibility of the Contractor for Design. The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other non-construction services furnished by the Contractor under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiency in its designs, drawings, specifications, and other non-construction services and perform any necessary rework or modifications, including any damage to real or personal property, resulting from the design error or omission.

(1) The standard of care for all design services performed under this agreement shall be the care and skill ordinarily used by members of the architectural or engineering professions practicing under similar conditions at the same time and locality. Notwithstanding the above, in the event that the contract specifies that portions of the Work be performed in accordance with a performance standard, the design services shall be performed so as to achieve such standards.

(2) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract, shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract. The Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the Government caused by the Contractor's negligent performance of any of these services furnished under this contract.

(3) The rights and remedies of the Government provided for under this contract are in addition to any other rights and remedies provided by law.

(4) If the Contractor is comprised of more than one legal entity, each entity shall be jointly and severally liable hereunder.

(d) Contractor's Role during the Design Process. The Contractor's construction management key personnel shall be actively involved during the design process to effectively integrate the design and construction requirements of this contract. In addition to the typical required construction activities, the Contractor's involvement includes, but is not limited to actions such as: integrating the design schedule into the Master Schedule to maximize the effectiveness of fast-tracking design and construction (within the limits allowed in the contract), ensuring constructability and economy of the design, integrating the shop drawing and installation drawing process into the design, executing the material and equipment acquisition programs to meet critical schedules, effectively interfacing the design and construction quality control (QC) management programs with the design QC program, and maintaining and providing the design team with accurate, up-to-date redline and as-built documentation for eventual submission as Record Drawings. The Contractor shall require and manage the active involvement of key trade subcontractors in the above

activities.

(e) Deviating from the Accepted Design. The Contractor must obtain the approval of the Designer of Record and the Government's concurrence, in the form of supplemental agreement to the contract, for any Contractor-proposed revision to the professionally stamped-and-sealed and Government-reviewed final design that has been released for Construction before proceeding with the revision. The Government reserves the right to disapprove such a revision.

(1) The Government reserves the right to non-concur with any revision to the final design that has been released for construction, including those which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed design.

(2) Any Contractor-proposed revision to the design which deviates from the contract requirements (i.e., the Request for Proposal (RFP) and the accepted proposal), will require a bilateral modification (e.g. supplemental agreement) to the contract before any work commences.

(3) Unless the Government initiates a change to the contract requirements, or the Government determines that the Government furnished design criteria are incorrect and must be revised, any Contractor initiated proposed change to the contract requirements, which results in additional cost, shall strictly be at the Contractor's expense.

(4) The Contractor shall track all approved revisions to the reviewed and accepted design and shall incorporate them into the as-built design documentation, in accordance with agreed procedures. The Designer of Record shall document its professional concurrence on the as-builts for any revisions in the stamped and sealed drawings and specifications.

(f) Value Engineering after Award. In reference to Federal Acquisition Regulation (FAR) 52.248-3, Value Engineering - Construction, the Government may refuse to entertain a "Value Engineering Change Proposal" (VECP) for those "performance oriented" aspects of the Solicitation documents which were addressed in the Contractor's accepted contract proposal and which were evaluated in competition with other offerors for award of this contract.

(1) The Government may consider a VECP for those "prescriptive" aspects of the Solicitation documents, not addressed in the Contractor's accepted contract proposal or addressed but evaluated only for minimum conformance with the Solicitation requirements.

(2) For purposes of this clause, the term "performance oriented" refers to those aspects of the design criteria or other contract requirements, which allow the offeror or Contractor certain latitude, choice of and flexibility to propose in its accepted proposal a choice of design, technical approach, design solution, construction approach or other approach to fulfill the contract requirements. Such requirements generally tend to be expressed in terms of functions to be performed, performance required or essential physical characteristics, without dictating a specific process or specific design solution for achieving the desired result.

(3) In contrast, for purposes of this clause, the term

"prescriptive" refers to those aspects of the design criteria or other Solicitation requirements wherein the Government expressed the design solution or other requirements in terms of specific material, approaches, systems, and/or processes to be used. Prescriptive aspects typically allow the offerors little or no freedom in the choice of design approach, materials, fabrication techniques, methods of installation, or any other approach to fulfill the contract requirements.

(g) Warranty of Design. The Contractor warrants that the design shall be performed in accordance with the contract requirements. Design and design related construction not conforming to the Contract requirements shall be corrected at no additional cost to the Government. The standard of care for design is defined in paragraph c of this clause, Responsibility of the Contractor for Design.

(1) The period of this warranty shall commence upon final completion and the Government's acceptance of the work, or in the case of the Government's beneficial occupancy of all or part of the work for its convenience, prior to final completion and acceptance, at the time of such occupancy.

(2) This design warranty shall be effective from the above event through the Statute of Limitations and Statute of Repose or host nation law, as applicable to the place of construction performance.

(3) The rights and remedies of the Government provided for under this clause are in addition to any other rights and remedies provided in this contract or by law.

(h) Government Re-Use of Design. In conjunction with the Defense Federal Acquisition Regulation Supplement (DFARS) 252.227-7022, Government Rights (Unlimited), the Government will not ask for additional originals or copies of the design works after the Contractor provides all required design documentation and record drawing documentation under the instant contract. Further, if the Government uses the design for other projects without additional compensation to the Contractor for re-use, the Government releases the Contractor from liability in the design on the other projects, due to defects in the design that are not the result of fraud, gross mistake as amounts to fraud, gross negligence or intentional misrepresentation.

(End of clause)

1.3 CONTRACTOR SUPPLY AND USE OF ELECTRONIC SOFTWARE FOR PROCESSING CONSTRUCTION WAGE RATE REQUIREMENTS STATUTE CERTIFIED LABOR PAYROLLS

a. Use a commercially-available electronic system to process and submit certified payrolls electronically to the Government. The requirements for preparing, processing and providing certified labor payrolls are established by the Wage Rate Requirements statute.

b. Obtain and provide for all access, licenses, and other services required to provide for receipt, processing, certifying, electronically transmitting to the Government, and storing weekly payrolls and other data required for the Contractor to comply with the Wage Rate Requirements statute. Use the electronic payroll service to prepare, process, and maintain the relevant payrolls and basic records during all work under this construction contract. The electronic payroll service must be capable of preserving these payrolls and related basic records for the required three years after contract completion. Obtain and provide electronic

system access to the Government, as required to comply with the Wage Rate Requirements over the duration of the construction contract.

c. The Contractor's provision and use of an electronic payroll processing system must meet the following basic functional criteria:

- (1) commercially available;
- (2) compliant with appropriate Wage Rate Requirements statute payroll provisions in the FAR;
- (3) able to accommodate the required numbers of employees and subcontractors planned to be employed under the contract;
- (4) capable of producing an Excel spreadsheet-compatible electronic output of weekly payroll records for export into an Excel spreadsheet to be imported into the contractor's mode of Resident Management System 3.0;
- (5) demonstrated security of data and data entry rights;
- (6) ability to produce Contractor-certified electronic versions of weekly payroll data;
- (7) ability to identify erroneous entries and track the data/time of all versions of the certified Wage Rate Requirements statute payrolls submitted to the government over the life of the contract;
- (8) capable of generating a durable record copy in a Compact Disc (CD) or Digital Versatile Disc (DVD) and Portable Document Format (PDF) file record of data from the system database at the end of the contract closeout. This durable record copy of data from the electronic payroll processing system must be provided to the Government during contract closeout.

d. All Contractor-incurred costs related to the Contractor's provision and use of an electronic payroll processing service must be included in the Contractor's price for the overall work under the contract. The costs for compliance with the Wage Rate Requirements statute by using electronic payroll processing services must not be a separately bid or reimbursed item under this contract.

1.4 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS

In addition to complying with the requirements outlined in FAR Part 22.13, FAR Provision 52.222-38, FAR Clause 52.222-35, FAR Clause 52.222-37, DFARS 222.13 and Department of Labor regulations, U.S. Army Corps of Engineers (USACE) contractors and subcontractors at all tiers are encouraged to promote the training and employment of U.S. veterans while performing under a USACE contract. While no set-aside, evaluation preference, or incentive applies to the solicitation or performance under the resultant contract, USACE contractors are encouraged to seek out highly qualified veterans to perform services under this contract. The following resources are available to assist USACE contractors in their outreach efforts:

- U.S. Department of Labor Veterans' Employment and Training Service (VETS):
<https://www.dol.gov/vets/>
- Federal Veteran Employment Information: <https://www.fedshirevets.gov/>
- Veterans Opportunity to Work (VOW) Program:

<https://www.benefits.va.gov/vow/>
- U.S. Army Warrior Transition Command Employment Index:
<https://wct.army.mil/modules/employers/index.html>
- Hiring Our Heroes: <https://www.uschamberfoundation.org/hiring-our-heroes>

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Equipment Room Drawings; G, RO

Usace Bim Project Execution Plan (Usace Pxp) Template; G, RO

1.6 SEQUENCE OF DESIGN CONSTRUCTION

(a) After receipt of the Contract Notice to Proceed (NTP), the Contractor must initiate design, comply with all design submission requirements as covered in Division 01 General Requirements of the advertised Solicitation, and obtain Government review of each submission. No construction may be started until the Government reviews the 100 Percent Corrected Design submission and determines it satisfactory for purposes of beginning construction. The Contractor has the option to submit the design as an entirely complete design package (design analysis, plans, and specifications and other design deliverables) or as two (2) separate complete design packages (design analysis, plans, and specifications and other design deliverables), one for the site work, long lead items and utilities and one for all other work. Each package will require the same design submittals, design reviews and design review conferences as set forth in the Contract. The Government will not grant any time extension for any design resubmittal required when, in the opinion of the Contracting Officer, the initial submission failed to meet the minimum quality requirements as set forth in the Contract.

(b) If the Government allows the Contractor to proceed with limited construction based on pending minor revisions to the reviewed 100 Percent Corrected Design submission, no payment will be made for any in-place construction related to the pending revisions until they are completed, resubmitted and are satisfactory to the Government. Proceeding with limited construction requires written authorization by the Contracting Officer.

1.7 CONTRACTOR PERFORMANCE EVALUATIONS

See Federal Acquisition Regulation (FAR) Subpart 42.1502(e) for the requirements on past performance evaluations for construction contracts. For construction contracts valued at or above \$750,000.00, including all modifications, the USACE will evaluate Contractor's performance using the web-based Contractors Performance Assessment Reporting System (CPARS). After the USACE drafts an evaluation (interim or final), the Contractor will have the opportunity to access, review, comment and either concur or non-concur with the evaluation in the CPARS system for a period of 60

days. Access to the CPARS system requires either specific software called PKI certification (recommended method) or a username and password. The PKI certification is a Department of Defense recommendation and to provide security in electronic transactions. The certification software could cost approximately \$110 - \$125 per certificate per year and may be purchased from an External Certificate Authorities (ECA) vendor. Current information about the PKI certification process and contacting vendors can be found on the web site: <https://www.cpars.gov>.

1.8 ANTITERRORISM (AT)/OPERATIONS SECURITY (OPSEC) PROVISIONS

1. AT Level I Training

All Contractor employees, to include subcontractor employees, requiring access to installations, facilities and controlled access areas shall complete AT Level I awareness training within 30 calendar days after contract start date or effective date of incorporation of this requirement into the contract, whichever is applicable. Upon request, the Contractor shall submit certificates of completion for each affected Contractor employee and subcontractor employee, to the COR or to the contracting officer (if a COR is not assigned), within 5 calendar days after completion of training by all employees and subcontractor personnel. AT Level I awareness training is available at the following website: <https://jko.jten.mil/courses/AT-level1/launch.html>. ; or it can be provided by the RA ATO in presentation form which will be documented via memorandum.

2. Access and General Protection/Security Policy and Procedures

All contractor and all associated sub-contractors employees shall comply with applicable installation, facility and area commander installation/facility access and local security policies and procedures (provided by government representative). The contractor shall also provide all information required for background checks to meet installation/facility access requirements to be accomplished by installation Provost Marshal Office, Director of Emergency Services or Security Office. Contractor workforce must comply with all personal identity verification requirements (FAR clause 52.204-9, Personal Identity Verification of Contractor Personnel) as directed by DOD, HQDA and/or local policy. In addition to the changes otherwise authorized by the changes clause of this contract, should the Force Protection Condition (FPCON) at any installation or facility change, the Government may require changes in contractor security matters or processes.

3. For Contractors Who Do Not Require CAC, But Require Access To A Dod Facility Or Installation

Contractor and all associated sub-contractors employees shall comply with adjudication standards and procedures using the National Crime Information Center Interstate Identification Index (NCIC-III) and Terrorist Screening Database (TSDB) (Army Directive 2014-05 / AR 190-13), applicable installation, facility and area commander installation/facility access and local security policies and procedures (provided by government representative, as NCIC and TSDB are available).

4. Suspicious Activity Reporting Training (e.g. iWATCH, CorpsWatch, or See Something, Say Something)

The contractor and all associated sub-contractors shall receive a

brief/training (provided by the RA) on the local suspicious activity reporting program. This locally developed training will be used to inform employees of the types of behavior to watch for and instruct employees to report suspicious activity to the project manager, security representative or law enforcement entity. This training shall be completed within 30 calendar days of contract award and within 30 calendar days of new employees commencing performance with the results reported to the COR NLT 5 calendar days after the completion of the training.

5. OPSEC Training

All new contractor employees will complete Level I OPSEC Training within 30 calendar days of their reporting for duty. Additionally, all contractor employees must complete annual OPSEC awareness training. The contractor shall submit certificates of completion for each affected contractor and subcontractor employee, to the COR or to the contracting officer (if a COR is not assigned), within 5 calendar days after completion of training. OPSEC awareness training is available at the following websites: <https://www.iad.gov/ioss/> or <http://www.cdse.edu/catalog/operations-security.html>; or it can be provided by the RA OPSEC Officer in presentation form which will be documented via memorandum.

6. Pre-Screen Candidates using E-Verify Program

The Contractor must pre-screen Candidates using the E-verify Program (<http://www.uscis.gov/e-verify>) website to meet the established employment eligibility requirements. The Vendor must ensure that the Candidate has two valid forms of Government issued identification prior to enrollment to ensure the correct information is entered into the E-verify system. An initial list of verified/eligible Candidates must be provided to the COR no later than 3 business days after the initial contract award.

7. Threat Awareness Reporting Program (TARP) Training

All new contractor employees will complete annual Threat Awareness and Reporting Program (TARP) Training provided by a Counterintelligence Agent, IAW AR 381-12. The contractor shall submit certificates of completion for each affected contractor and subcontractor employee(s) or a memorandum for the record, to the COR or to the contracting officer (if a COR is not assigned), within 5 calendar days after completion of training. Authorized webbased TARP training for CAC card holders is available at the following website: <https://www.lms.army.mil>. Log in using CAC and search for "TARP".

1.9 EXCEPTION TO COMPLETION TIME AND LIQUIDATED DAMAGES

In case the Contracting Officer determines that seeding, sodding, and/or planting and/or the specified maintenance thereof is not feasible during the construction period, such work will be exempt from the completion time and liquidated damages. Accomplish this work during the first seeding, sodding, and/or planting period and the specified maintenance period following the completion date.

1.10 REQUEST FOR PROPOSAL (RFP) DRAWINGS

Fourteen (14) calendar days after Notice to Proceed, the Government will provide the successful Contractor an electronic copy containing editable RFP CAD file drawings (file format and general CAD requirements are defined in 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS

for use in preparation of design drawing deliverables. As-built drawing requirements are specified in Section 01 78 39.00 24 AS-BUILT DRAWINGS.

1.11 CONCURRENT CONSTRUCTION

Construction work closely related to and/or located at the site of the work under a concurrent contract may be in progress simultaneously with work under this contract. The location of this concurrent work is shown on the drawings or described in these specifications. Cooperate with others as necessary in the interest of timely completion of all work. In the event of interference, the notify the Contracting Officer (CO) immediately for resolution and the CO decision is final.

1.12 PAYMENT

1.12.1 PROMPT PAYMENT ACT

Pay requests authorized in GENERAL CONDITIONS (CONTRACT CLAUSES) clause: "Payments Under Fixed-Price Construction Contracts", will be paid pursuant to the clause, "Prompt Payment for Construction Contracts". Submit pay requests on ENG Form 93 and 93a, "Payment Estimate-Contract Performance" and "Continuation". All information and substantiation required by the identified contract clauses must be submitted with the ENG Form 93, and the required certification included on the last page of the ENG Form 93a, signed by an authorized contractor official and dated when signed. The designated billing office is the Office of the Area Engineer.

1.12.2 PAYMENT FOR MATERIALS STORED OFFSITE

a. As allowed under (FAR) 52.232-5 "Payments Under Fixed Price Construction Contracts", the Administrative Contracting Officer, at their discretion, may authorize progress payments for any material stored off-site provided:

- (1) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract,
- (2) Material is stored in such a manner to protect it from damage, fire, theft, etc.
- (3) The Contractor provides evidence of insurance for material, and,
- (4) Material is clearly identified and delineated by contract number for use on the applicable project.

b. The Administrative Contracting Officer reserves the right to inspect any off-site material prior to authorizing progress payments. Provide paid invoices listing the value of material and labor incorporated in the items.

1.13 AVAILABILITY OF UTILITY SERVICES

All reasonably required amounts of domestic water and electricity will be made available to the Contractor by the Government from existing system outlets and supplies. The Contractor is responsible to , at their own expense, make all temporary connections and install distribution lines. Furnish to the Contracting Officer a complete system layout drawing showing type of materials to be used and method of installation for all

temporary electrical systems. Make arrangements with the Using Service, through the Contracting Officer, as to the method of determining the amount of water and electricity to be used by and the method of payment therefore. All temporary lines must be maintained in a workmanlike manner satisfactory to the Contracting Officer and removed by the Contractor in like manner prior to final acceptance of the construction. Normal quantities of electricity and water used to make final tests of completely installed systems will be furnished by the Government.

1.14 UTILITY SERVICE INTERRUPTIONS

Submit written notification not less than 15 calendar days in advance of each interruption of each utility and communication service to or within existing buildings and facilities being used by others. No single outage will exceed 4 hours unless approved in writing. The time and duration of all outages will be coordinated and approved with the Using Agency by the Contracting Officer.

1.15 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

a. This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Default: (Fixed-Price Construction)." In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON (5) DAY WORK WEEK

	Jan	23
	Feb	20
	Mar	15
	Apr	4
	May	5
	Jun	5
	Jul	4
	Aug	4
	Sep	4
	Oct	4
	Nov	10
Dec	22	

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the RMS daily CQC report, any occurrence of adverse weather and resultant impact to normally scheduled work, within 24 hours of the event. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day. Describe in the RMS daily CQC reports the critical path item that is being affected and provide the critical path activity number(s) from the current schedule. The COR must acknowledge and accept the agreed upon occurrence of each adverse weather delay in RMS for the delays to be considered as adverse weather delays.

At the end of each month, identify the number of actual adverse weather delay days that includes days impacted by actual adverse weather (even if adverse weather occurred in previous month), calculated chronologically from the first to the last day of each month, and recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b. above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Default (Fixed Price Construction)". (ER 415-1-15)

d. The number of annual Grand Forks AFB closure days due to weather is a maximum of ten.

1.16 INSURANCE REQUIRED

In accordance with GENERAL CONDITIONS (CONTRACT CLAUSES) clause: "Insurance Work on a Government Installation," procure the following minimum insurance:

Type	Amount
Workmen's Compensation and Employer's Liability Insurance	\$100,000
General Liability Insurance	\$500,000 per occurrence
Automobile Liability Insurance	
Bodily injury	\$200,000 per person and \$500,000 per occurrence
Property damage	\$ 20,000 per occurrence

(Coverages per FAR 28.307-2)

1.17 SECURITY REQUIREMENTS

1.17.1 Contractor's Employee Identification

The Contractor is responsible for furnishing to each employee and for requiring each employee engaged on the work to display such identification as may be approved and directed by the Contracting Officer. Upon release of any employees, deliver all prescribed identification immediately to the Contracting Officer for cancellation. When the contract involves work in restricted security areas, only employees who are U.S. citizens will be permitted to enter. Proof of U.S. citizenship is required prior to entry. When required by the Contracting Officer, obtain and submit fingerprints of all persons employed or to be employed on the project. (Based on FAR 52.204-2)

1.17.2 Entry Requirements

See Section 01 14 00 WORK RESTRICTIONS.

1.18 CONTRACTOR QUALITY CONTROL (CQC)

See Section 01 45 00.00 10 QUALITY CONTROL.

1.19 NONDOMESTIC CONSTRUCTION MATERIALS

The list of excepted nondomestic construction materials or their components referenced in the Buy American Construction Material Contract Clauses includes the list set forth in paragraph 25.104 of the Federal Acquisition Regulation.

1.20 DAILY WORK SCHEDULES AND WEEKLY COORDINATION MEETINGS

In order to closely coordinate work under this contract, prepare a written agenda/meeting minutes and attend a weekly coordination meeting with the Contracting Officer and Using Service at which time the Contractor must submit for coordination and approval, their proposed daily work schedule for the next two week period. Provide a copy of modifications (MODs), Serial Letters, Requests for Information (RFIs) and any other information that is needed in the minutes of the meeting. Include required temporary utility services, time and duration of interruptions, and protection of adjoining areas with the Contractor's proposed 2-week work schedule. At this meeting, the Contractor must also submit their schedule of proposed dates and times of all preparatory inspections to be performed during the next 2 weeks. All schedules shall be in developed in accordance with Section 01 32 01.00 10 PROJECT SCHEDULE Coordination action by the Contracting Officer relative to these schedules will be accomplished during these weekly meetings. Daily reports must be completed and given to the Contracting Officer or Representative within 24 hours of work. All official correspondence such as serial letters and RFIs, with attachments are to be provided in one hardcopy original with original signatures and one electronic (Adobe pdf format) copy by email. The Government will consider the correspondence to be received when the official hardcopy or electronic copy is received by the designated office.

1.21 AS-BUILT DRAWINGS

See SECTION 01 78 39.00 24 - AS-BUILT DRAWINGS

1.22 SIGN

On commencement of work on this project, furnish and erect the temporary sign in the location selected by the Contracting Officer near the project site. Maintain the sign in good condition through the project construction period. Upon completion of the project remove the sign from the premises. The project sign must conform to standard drawing bound herein. A decal of the "Engineer Castle" and the U. S. Air Force emblem will be furnished the Contractor upon request.

1.23 GOVERNMENT-FURNISHED PROPERTY

Pursuant to CONTRACT CLAUSES clause: "Government Property " the Government will furnish to the Contractor the following property to be incorporated

or installed in the work. Such property will be furnished f.o.b at the project site and the Contractor must accept delivery when made, and transport the property to the jobsite at their own expense. All such property must be installed or incorporated into the work at the expense of the Contractor. Verify the quantity and condition of such Government-furnished property when delivered to him and report the receipt of Government-Furnished Property in accordance with Section 00 72 00 GENERAL CONDITIONS (CONTRACT CLAUSES) DFARS 252.211-7007 REPORTING OF GOVERNMENT-FURNISHED PROPERTY. For damage or loss or property follow Section 00 72 00 GENERAL CONDITIONS (CONTRACT CLAUSES) DFARS 252.245-7002 REPORTING LOSS OF GOVERNMENT PROPERTY.

Quantity	Item	Description	Dollar Value
	FF&E package to be provided by the contractor.		

1.24 EQUIPMENT ROOM DRAWINGS

Prior to construction, prepare and submit room plans (see paragraph SUBMITTALS for conditions regarding this submittal under Design/Build procurement) for all mechanical, electrical, and communication rooms or similar areas. The plans must be consolidated for all trades, be to scale, and show all pertinent structural features. All equipment must be accessible and laid out in a good design and workmanship manner and layouts for communications rooms shall be completed as early as possible. In addition, other items such as doors, windows, and cabinets required for installation and which will affect the available space, must be shown. All mechanical and electrical equipment and accessories must be shown to scale in plan and elevation and/or section in their installed positions. All duct work and piping must be shown.

1.25 CONTRACTOR FURNISHED EQUIPMENT DATA

See Section 01 78 36.00 24 WARRANTY OF CONSTRUCTION AND DESIGN for Contractor Furnished Equipment Data to be submitted as part of the Warranty Equipment Booklet.

1.26 ACCOMMODATIONS FOR GOVERNMENT INSPECTORS

Furnish furnish a temporary office facility approximately 10 feet x 20 feet with a minimum of 200 square feet of floor space. Locate the temporary office facility where directed and it must be reserved for Government personnel only. Furnish and maintain drinking water facilities, adequate lighting, local commercial telephone service, air-conditioning, heating equipment, and a partition enclosed chemical toilet. The office must be furnished with one legal size filing cabinet with four drawers, one drafting table with stool, one plan rack, one desk, and three chairs. Used furniture, in good condition, will be acceptable. Equip entrance doors with a substantial lock. The Contractor must provide janitor service, fuel for the heating facilities, electricity, telephone and water, all at no cost to the Government, except the Contractor will not be liable for Government long-distance calls. Construct the building so as to be easily moved and relocate the building twice during the contract, if so directed. The entire facility, including furniture, will remain the property of the Contractor and removed from the site after completion of the work.

1.27 SPECIAL INSTRUCTIONS FOR PROGRESS CHARTS

Submit in accordance with the GENERAL CONDITIONS (CONTRACT CLAUSES) clause

entitled "Schedules for Construction Contracts" and indicate the required data for each of the principal features of the work. Contract changes or modifications will not include extensions of time unless the updated progress chart shows that the contract completion date is delayed due to the affect of the change on one or more principal features of the work.

1.28 PARTNERING

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.

1.28.1 Facilitated (Formal) Partnering

- a. Within 45 calendar days after award and prior to the start of work, or as coordinated with and approved by the Government, host a Formal Partnering session with key personnel from the project team including both Contractor and Government personnel. All costs associated with the Partnering session including the third-party independent Facilitator Consultant, meeting room and other incidental items are the responsibility of the Contractor.
- b. Before the Facilitated (Formal) Partnering session, coordinate with the Facilitator all requirements for incidental items (such as audio-visual equipment, easels, flipchart paper, colored markers, note pads, pens/pencils, colored flash cards) and have these items available at the Partnering session. Provide copies of any documents required for distribution to all attendees. Participants will bear their own costs for meals, lodging and transportation associated with Partnering.
- c. The Initial Partnering Session must be a duration of one day and be held at a location off base as agreed to by the Contracting Officer.
- d. Facilitator must be experienced in conducting corporate Partnering sessions and must be a third-party independent facilitating consultant - not an employee of the Contractor. The Facilitator is responsible for leading all aspects of the Partnering session necessary to achieve the Partnering goal.
- e. An outcome of the Partnering session must be an escalation matrix agreed upon by both the Government and Contractor, which identifies key Government and Contractor decision makers by name and anticipated decision durations.
- f. Host follow-on Partnering Sessions at three- to six-month intervals or more frequently if needed and lasting generally a half day or less. Attendees need only be those required to resolve current issues. The same Facilitator used in the Initial Partnering session must lead the follow-on sessions unless an alternative is permitted by the Contractor Officer. All costs associated with follow-on Partnering sessions are the responsibility of the Contractor.

1.28.2 Team-Led (Informal) Partnering

- a. The Contracting Officer will coordinate the initial Team-Led (Informal) Partnering Session with key personnel of the project team, including Contractor and Government personnel. The Partnering Session will be co-led by the Government Construction Manager and Contractor's Project Manager.
- b. Hold partnering sessions at a location mutually agreed to by the Contracting Officer and the Contractor, typically at a conference room on-base or at the Contractor's temporary trailer.
- c. Conduct the Initial Team-Led Partnering Session and facilitate using electronic media (a video and accompanying forms) provided by the Contracting Officer.
- d. The Partners will determine the frequency of the follow-on sessions.
- e. Participants will bear their own costs for meals, lodging and transportation associated with Partnering.

1.29 PROFIT

a. Use the weighted guidelines method of determining profit on any equitable adjustment change order or modification issued under this contract. The profit factors must be as follows:

Factor	Rate	Weight	Value
Degree of Risk	20	See Item	
Relative difficulty of work	15	b. below	
Size of Job	15		
Period of performance	15		
Contractor's investment	5		
Assistance by Government	5		
Subcontracting	25		
	100		

b. Based on the circumstances of each procurement action, each of the above factors must be weighted from .03 to .12 as indicated below. Obtain the value by multiplying the rate by the weight. The value column when totaled indicates the fair and reasonable profit percentage under the circumstances of the particular procurement.

(1) Degree of Risk. Where the work involves no risk or the degree of risk is very small, the weighting should be .03; as the degree of risk increases, the weighting should be increased up to a maximum of .12. Lump sum items will have, generally, a higher weighted value than the unit price items for which quantities are provided. Other things to consider: the portion of the work to be done by subcontractors, nature of work, where work is to be performed, reasonableness of negotiated costs, amount of labor included in costs, and whether the negotiation is before or after performance of work.

(2) Relative Difficulty of Work. If the work is most difficult and complex, the weighting should be .12 and should be proportionately reduced to .03 on the simplest of jobs. This factor is tied in to some extent with the degree of risk. Some things to consider: the nature of the work, by whom it is to be done, where, and what is the time schedule.

(3) Size of Job. All work not in excess of \$100,000 shall be weighted at .12. Work estimated between \$100,000 and \$5,000,000 shall be proportionately weighted from .12 to .05.

(4) Periods of Performance. Jobs in excess of 24 months are to be weighted at .12. Jobs of lesser duration are to be proportionately weighted to a minimum of .03 for jobs not to exceed 30 days. No weight where additional time not required.

(5) Contractor's Investment. To be weighted from .03 to .12 on the basis of below average, average, and above average. Things to consider: amount of subcontracting, mobilization payment item, Government furnished property, equipment and facilities, and expediting assistance.

(6) Assistance by Government. To be weighted from .12 to .03 on the basis of average to above average. Things to consider: use of Government-owned property, equipment and facilities, and expediting assistance.

(7) Subcontracting. To be weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the work is to be subcontracted, the weighting is to be .03 and such weighting proportionately increased to .12 where all the work is performed by the Contractor's own forces.

1.30 LABOR CONDITIONS APPLICABLE TO TEMPORARY FACILITIES

It is the position of the Department of Defense that the Davis-Bacon Act, 40 U.S.C. 276a is applicable to temporary facilities such as job headquarters, tool yards, batch plants, borrow pits, sandpits, rock quarries, and similar operations, provided they are dedicated exclusively, or nearly so, to performance of the contract or project, and provided they are adjacent or virtually adjacent to the site of the work and are established after receipt of the proposal or bid. Clause "Payrolls and Basic Records" of the GENERAL CONDITIONS (CONTRACT CLAUSES) is applicable to such operations.

1.31 DRAWING SCALES

All scales shown on the RFP project drawings are based on a standard drawing size of 22" x 34". If any other size drawings are furnished or plotted, the contractor adjust the scales accordingly. The Contractor must also advise their sub-contractors of the above.

1.32 FEDERAL HOLIDAYS

The following Federal legal holidays are observed by this installation:

New Year's Day	1 January
Martin Luther King's Birthday	Third Monday in January
President's Day	Third Monday in February
Memorial Day	Last Monday in May
Juneteenth	19 June
Independence Day	4 July
Labor Day	First Monday in September
Columbus Day	Second Monday in October
Veterans Day	11 November
Thanksgiving Day	Fourth Thursday in November
Christmas Day	25 December

If a wage determination applies the number of holidays specified on it, it has priority over this requirement.

1.33 BASE HOURS

Base operation hours are 7:00 a.m. to 5:00 p.m. daily (Monday through Friday), excluding federal holidays. Access to the base during other times must be requested in writing from the Contracting Officer. Federal Holidays and weekends are considered as scheduled non-workdays.

1.34 USACE BIM PROJECT EXECUTION PLAN (USACE PxP) TEMPLATE

The Contractor is required to submit a completed copy of the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template for this project to the CAD BIM Manager of the Omaha District for approval. See 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/CAD) REQUIREMENTS.

This section defines basic project reference information and BIM related project milestones.

1. FACILITY OWNER: U.S. AIR FORCE
2. PROJECT NAME: Disaster Resiliency Program Building 631
3. PROJECT LOCATION: Grand Forks AFB, ND
4. CONTRACT TYPE: DESIGN-BUILD
5. FACILITY TYPE: Formal Training Unit
6. PROJECT NUMBERS:

PROJECT INFORMATION	NUMBER
USACE PROJECT NUMBER:	503730
Project Code:	GFND00100

7. CADD BIM MANAGER: John Anderson

1.35 COST AND TIME IMPACT (CTI) LOG

a. Any changes with an absolute value under the Simplified Acquisition Threshold (SAT) at the time of initiation of the change and within the Administrative Contracting Officer's (ACO) authority, may be executed using the Cost and Time Impact Log (CTI Log) processes as described herein. The purpose of the CTI Log is to provide efficient and effective change management process for the mutual benefit of the Government and the Contractor while partnering to execute this contract.

b. The CTI Log process is a collaborative, proactive, and efficient change management process. In general, the CTI Log process is as described below.

1. The CTI Log is designated for use on work items determined to be changes where individual costs are anticipated to be less than the SAT. The process starts with a discussion between USACE on-site Contracting Officer's Representative (COR) or ACO and the prime contractor's authorized field representative. If it appears

the issue cannot be resolved through a no-cost clarification of the contract requirements, the USACE COR will request the contractor to submit a confirming Request for Information (RFI). Where the solution to the problem is not apparent and not initially resolvable at the field level, the Contractor may submit to USACE a "non-confirming" RFI and USACE shall provide technical direction. If the absolute value of the change is anticipated to exceed the SAT, the contractor will be advised that a Request for Proposal (RFP) for the change will be forthcoming and that the CTI Log process shall not be utilized.

2. The contractor submits the confirming RFI identifying the potential Cost and/or Time impact issue as previously discussed between the USACE COR and the contractor's field representative, along with a proposed solution. In addition to the technical details, the RFI shall contain, to the maximum extent practicable, a proposal for the change from the contractor with an acceptable breakdown of all costs (representing both the prime and each of the applicable subcontractors' costs) to include labor, equipment and material. Time impacts, if applicable, must include a Time Impact Analysis (TIA) of work activities. The prime and subcontractor(s) will provide their markups for each of the individual changes as they arise, to include profit development in accordance with (IAW) the alternate Weighted Profit Guidelines approach per UAI 5115.404-73. If mutually agreed upon by both the Government and Contractor, the Contractor may submit the confirming RFI without the detailed cost proposal and/or the Time Impact Analysis, but shall contain a ROM of cost impacts and time impacts. If it is mutually agreed that the Contractor's cost proposal and TIA may not be included in the confirming RFI, the Contractor shall submit both the proposal and TIA as soon as practicable or by the date specified in the Government's response to the RFI, whichever is sooner.

3. If the proposal and TIA are included in the RFI from the Contractor, the Government shall evaluate the Contractor's technical recommendation in the RFI, the Contractor's proposal, and the TIA. When the technical solution is determined and any cost and/or time impacts are discussed, negotiated (if necessary), and determined to be fair and reasonable, the Government ACO will return the RFI with the technical solution and note that the formal price and time agreement will be captured on the CTI Log. Under no circumstances will the RFI response act as a Notice to Proceed (NTP) to incur increased costs or time impacts. The official NTP for the applicable change will be granted upon signing of the CTI Log. If the RFI is submitted and signed by the Government without cost and time impacts known, the Government shall return the RFI with the technical direction and request the proposal and TIA by an established suspense date. In either instance, the CTI Log will note the agreed upon price for the change (if any), time extension (if any), and will establish the NTP for the technical direction captured in the RFI.

4. After arriving at a bilateral agreement on price and time impacts associated with the change, the ACO and the contractor's representative will enter the RFI number and the agreed upon "reasonable price" on the contract CTI Log. At this time, the ACO will electronically sign the applicable log entries, authorizing

the contractor to proceed with the scope described by the RFI and at the reasonable price agreed upon. The contractor's authorized representative must also acknowledge the cost and time impact by signing the CTI Log item, prior to proceeding with the work. The official NTP will occur when both the Government and Contractor have both signed the CTI Log.

5. When the aggregate absolute value of changes approaches the appointed ACO's warrant threshold, the individual CTI Log entries (and associated RFIs) shall be captured in a single modification document (SF 30). The "SCOPE" paragraph of the modification will contain a summary list of the incorporated CTI Log items. These aggregate modifications will be processed at least once every month, at a different interval as mutually agreed upon, or when expedited processes are needed to pay for critical features of work such that subcontractors have the ability to bill for work completed in the field. The ACO will sign the SF 30 and provide to the contractor for its signature and return. After the SF30 is executed, the Contractor can bill for the earnings included in the associated CTI Log items listed on the SF30.

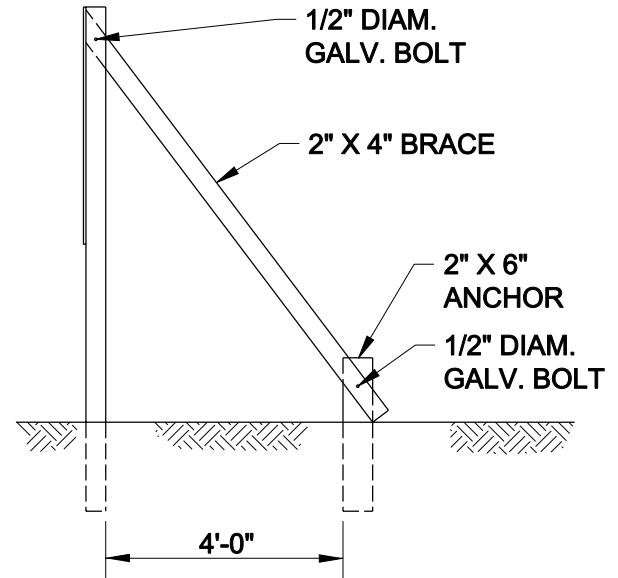
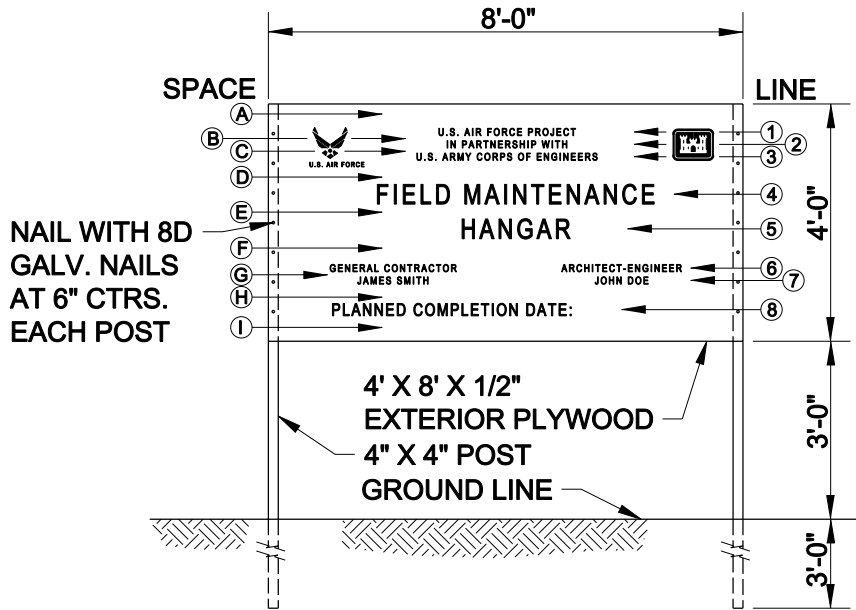
6. The CTI Log process may be utilized during the performance of this contract unless termination or suspension of this change management process is desired by either party.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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FRONT VIEW

END VIEW

U.S. AIR FORCE MCP PROJECTS PROJECT SIGN DETAILS

NO SCALE

SCHEDULE

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT	STROKE
A	4"	1	U.S. AIR FORCE PROJECT	1.5"	3/16"
B	2"	2	IN PARTNERSHIP WITH	1.5"	3/16"
C	2"	3	U.S. ARMY CORPS OF ENGINEERS	1.5"	3/16"
D	5"	4	PROJECT NAME	4"	1/2"
E	3"	5	PROJECT NAME CONT'D (IF REQ'D)	4"	1/2"
F	5"	6	GENERAL CONTRACTOR/A-E	1.5"	3/16"
G	1"	7	GENERAL CONTRACTOR/A-E	1.5"	3/16"
H	4"	8	PLANNED COMPLETION DATE	2.5"	1/4"
I	4"				

NOTES:

1. POSTS SHALL BE S4S.
2. PLYWOOD SHALL BE EXTERIOR TYPE, A-C GRADE.
3. BEFORE PAINTING, SURFACE SHALL BE CLEAN, DRY, FREE OF GREASE AND SANDED.
4. PAINT WITH ONE EXTERIOR OIL PRIME COAT AND TWO COATS EXTERIOR TYPE ALKYD, CONFORMING TO MASTER PAINTERS INSTITUTE MPI-9, MPI GLOSS LEVEL 6. COLOR SHALL MATCH EITHER BENJAMIN MOORE CARIBBEAN AZURE (2059-20) OR PITTSBURGH PAINTS WARM WASSAIL (428-7) AS DIRECTED BY THE CONTRACTING OFFICER'S REPRESENTATIVE.
5. ALL LETTERING SHALL BE EXTERIOR TYPE ALKYD. COLOR SHALL BE WHITE.
6. DECALOMANIA FOR CORPS OF ENGINEERS INSIGNIA AND U.S. AIR FORCE EMBLEM WILL BE FURNISHED BY THE CONTRACTING OFFICER FOR INSTALLATION BY THE CONTRACTOR.
7. ALL EXPOSED WOOD (POSTS, SUPPORTS, BACK, ETC.) SHALL BE PAINTED THE SAME BACKGROUND COLOR AS THE SIGN.
8. LETTERING STYLE SHALL BE EITHER HELIOS EXTRA BOLD CONDENSED, HELIOS BOLD II, HELVETICA BLACK ROMAN, OR HELVETICA BOLD ROMAN.

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BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST (SEE INSTRUCTIONS ON REVERSE)						REQUEST NUMBER	
1. CLEARANCE IS REQUESTED TO PROCEED WITH THE WORK AT							
On Work Order No.				, or Contract No.		, involving excavation or utility disturbance per	
attached sketch (picture). This area <input type="checkbox"/> has <input type="checkbox"/> has not been staked or clearly marked.							
2. TYPE OF FACILITY/WORK INVOLVED							
A. PAVEMENTS		D. FIRE DETECTION & PROTECTION SYSTEMS			G. AIRCRAFT OR VEHICULAR TRAFFIC FLOW		
B. DRAINAGE SYSTEMS		E. UTILITY	OVERHEAD	UNDERGROUND	H. SECURITY		
C. RAILROAD TRACKS		F. COMM	OVERHEAD	UNDERGROUND	I. OTHER		
3. DATE PREPARED				4. DATE CLEARANCE REQUIRED		5. DATE OF CLEARANCE (AUTHORIZED)	
6. REQUESTING OFFICIALS NAME and EMAIL					7. TELEPHONE NUMBER		8. ORGANIZATION
S E C U R I T Y E N G I N E E R I N G	9. ORGANIZATION		REMARKS		REVIEWER'S SIGNATURE		
	A. ELECTRICAL DISTRIBUTION 402-294-4829 OR 402-659-7420						
	B. ALARM SYSTEMS 402-294-9722						
	C. STEAM DISTRIBUTION / CHILL WATER / WELLS 402-294-5388						
	D. WATER DISTRIBUTION 402-294-5232						
	E. POL DISTRIBUTION 402-294-5232						
	F. SEWER DISTRIBUTION 402-294-5232						
	G. GAS DISTRIBUTION 402-294-5232						
	H. ENVIRONMENTAL 402-294-4087						
	I. PAVEMENTS/GROUNDS 402-294-3834						
	J. FIRE PROTECTION 402-294-5522						
	K. CATHODIC PROTECTION 402-294-4830						
	L. AFCEC ENVIRONMENTAL 402-232-3019						
	10. SFS - INSTALLATION SECURITY 402-294-6240 OR 294-2396						
11. SFS - ELECTRONIC SECURITY SECTION (ESS) 294-2433 or 294-6921							
12. SAFETY 402-294-6357							
13. COMMUNICATIONS - THEY WILL CONTACT YOU 402-294-5989							
14. BASE OPERATIONS - AIRFIELD 402-402-294-2793							
15. RISING VIEW 402-991-9840							
15. COMMERCIAL UTILITY COMPANY (TELEPHONE, GAS, ELECTRIC, CABLE) REFERENCE: NEBRASKA 811 TICKET NUMBER CALL: 811 OR 1-800-331-5666				ONE CALL #			
16. OTHER (SPECIFY)							
17. REQUESTED CLEARANCE <input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED							
18. TYPED NAME AND SIGNATURE OF APPROVING OFFICER (CHIEF OF OPERATIONS FLIGHT OR CHIEF OF ENGINEERING FLIGHT)						18a. DATE SIGNED	

INSTRUCTIONS

The BCE work clearance request is used for any work (contract or in-house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience at a minimum. It is used to identify potentially hazardous work conditions in an attempt to prevent accidents. the work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

19. REMARKS. (This section must describe specific precautionary measures to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment, should be included.)

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02/15

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PROJECT SCHEDULE
02/15

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.

AACE INTERNATIONAL (AACE)

AACE 29R-03 (2011) Forensic Schedule Analysis

AACE 52R-06 (2006) Time Impact Analysis - As Applied
in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11 (2017) Administration -- Project Schedules

1.2 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

Project Scheduler Qualifications; G, AO

Preliminary Project Schedule; G, AO

Initial Project Schedule; G, AO

Periodic Schedule Update; G, AO

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules

required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government default software is Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

Use of software other than Primavera P6 must be approved by the Contracting Officer. If a different software system is approved, the Contracting Officer may require the Contractor to provide for the Government's use up to two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15 Schedules for Construction Contracts. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of design and construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Designers, Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. Provide at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Also include review and correction periods associated with each item.

3.3.4 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.5 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

- a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).
- b. Submission, review and acceptance of design packages.

- c. Submission of mechanical/electrical/information systems layout drawings.
- d. Long procurement activities
- e. Submission and approval of O & M manuals.
- f. Submission and approval of as-built drawings.
- g. Submission and approval of DD1354 data and installed equipment lists.
- h. Submission and approval of testing and air balance (TAB).
- i. Submission of TAB specialist design review report.
- j. Submission and approval of fire protection specialist.
- k. Submission and approval of Building Commissioning Plan, test data, and reports: Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements. All tasks associated with all building testing and commissioning will be completed prior to submission of building commissioning report and subsequent contract completion.
- l. Air and water balancing.
- m. Building commissioning - Functional Performance Testing.
- n. Controls testing plan submission.
- o. Controls testing.
- p. Performance Verification testing.
- q. Other systems testing, if required.
- r. Contractor's pre-final inspection.
- s. Correction of punch list from Contractor's pre-final inspection.
- t. Government's pre-final inspection.
- u. Correction of punch list from Government's pre-final inspection.
- v. Final inspection.

3.3.6 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: acceptance, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.7 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop

and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the web site: <http://rms.usace.army.mil>.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*
*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.			

3.3.7.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, unless directed otherwise by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

3.3.7.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

- a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.
- b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.7.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.7.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.7.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.7.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are design phase, procurement phase and construction phase. Each activity can have only one Phase of Work code.

- a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction packages.
- b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.7.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.7.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.8 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.8.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

3.3.8.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End Project."

Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.8.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.8.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

3.3.8.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.9 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated adverse weather delay work days provided in the Special Contract Clauses. Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

3.3.10 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.11 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.12 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.13 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.14 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.15 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

a. Leads (negative lags) are prohibited.

- b. Start to Finish (SF) relationships are prohibited.

3.3.16 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

3.3.17 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.18 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.19 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.19.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than \$35,000 or 1 percent of the present contract value, whichever is greater, up to \$200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.19.2 O & M Manuals

Cost load the "Submission and approval of O & M manuals" activity not less than \$20,000. Activity will be declared 100 percent complete upon the Government's approval of all O & M manuals.

3.3.20 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

- a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.

- b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The files, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents.

3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead item acquisition prior to design completion. Also cover in the initial design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the

remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone. No payment will be made for work items not fully detailed in the Project Schedule.

3.4.2.1 Design Package Schedule Submission

With each design package submitted to the Government, submit a fragnet schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.3 Periodic Schedule Updates

Update the Project Schedule routinely at an interval approved by the Contracting Officer or designated representative. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress. Update the schedule to include detailed construction activities as the design progresses, but not later than the submission of the final un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission if such activity is authorized.

- a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.
- b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Submission

Submit the current project schedule, the narrative report and all required schedule reports electronically using the project submittal/transmittal process or by serialized letter. Each schedule must have a unique file name and use project specific settings.

3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

- a. Identify and discuss the work scheduled to start in the next update period.

- b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.
- c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.
- d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.
- e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.
- f. Identify and discuss out-of-sequence work.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer or designated representative. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. The following reports are required for schedule submission reviews unless directed otherwise by the Contracting Officer.

3.5.3.1 Activity Report

List of all activities sorted according to activity number.

3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based

on cost).

3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.5.3.6 Critical Path

Provide an Adobe .pdf report showing the critical path.

3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed percent complete, Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly and within five days of the proposed schedule data date. The Contractor may be requested to provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must

organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make updates to the draft submission. Include only those items approved by the Government in the submission. Upon Government approval of the schedule submission, submit an invoice for payment.

3.6.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP). All time impact analysis must be resource loaded and to the same level of detail as the schedule.

3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame

between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic,

constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS

Once the schedule is approved by the Government via submittal or serialized letter, upload the schedule data (SDEF) into the Resident Management System - Contractor Module (RMS CM) unless directed otherwise by the Contracting Officer. The contractor will then create the invoice and complete the Prompt Payment certificate and submit to the Government. After this is complete, create the invoice, complete the Prompt Payment certificate and submit to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 Payments under Fixed-Price Construction Contracts and FAR 52.232-27 Prompt Payment for Construction Contracts.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

The following settings are mandatory and required in all schedule submissions to the Government, if Primavera P6 is used:

- a. Activity Codes must be Project Level, not Global or EPS level.
- b. Calendars must be Project Level, not Global or Resource level.
- c. Activity Duration Types must be set to "Fixed Duration & Units".
- d. Percent Complete Types must be set to "Physical".
- e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40

hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.

- f. Set Schedule Option for defining Critical Activities to "Longest Path".
- g. Set Schedule Option for defining progressed activities to "Retained Logic".
- h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be \$1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.
- i. Activity ID's must not exceed 10 characters.
- j. Activity Names must have the most defining and detailed description within the first 30 characters.

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PART 1 GENERAL

1.1 SUMMARY

1.1.1 Submittal Information

The Contractor is responsible for total management of their work including, but not limited to, approval, scheduling, control, certification of all submittals and compliance with all applicable Buy-American and Trade Agreement clauses. The submittal management system provided in these specifications is intended to be a complete system for the Contractor to use to control the quality of materials, equipment and workmanship provided by manufacturers, fabricators, suppliers and subcontractors. Review each submittal for contract compliance.

Compliance with all applicable Buy American and Trade Agreement Clauses is to be included in this review. The Contractor must provide the country of origin on ENG Form 4025 for each item submitted. The Submittal Register (ENG Form 4288) will be utilized to log and monitor all submittal activities.

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 and the Designer of Record (DOR), if applicable, are to check and approve all items before submittal and stamp, sign, and date indicating action taken. Clearly identify proposed deviations from the contract requirements. 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 items.

1.1.3 Submission of Submittals

Schedule and provide submittals requiring Government approval, after notice to proceed (NTP). Provide ample lead time to ensure the submittal's processing by the Government and any lead time needed by the manufacturer upon ordering after approval. 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.

The Government reserves the right to handle pre-construction submittals (listed below) as administrative submittals via a Serial Letter, as directed by the Project, Area or Resident Office. When directed by the Project, Area or Resident Office (as directed), submit administrative submittals for acceptance by the Government. Format for the Serial Letter will be as directed by the Project, Area or Resident Office.

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

Permits

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-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

Design submittals, design substantiation submittals and extensions of design submittals.

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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

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

Unless directed otherwise or Government approval is required, all design submittals require Government Conformance Review "CR" after Designer of Record and Contractor review and approval. All submittals including "For Information Only" (FIO) submittals require approval by the Contractors Quality Control System Manager (CQCSM). The Government reserves the right during design review to provide comments to remove or add submittals which require Government review.

See paragraph Contractor Action Codes below.

The Designer of Record is to revise "G" designated submittals to "D" designated submittals in edited Unified Facilities Guide Specifications (UFGS), unless directed by COR to leave as "G" or use "A" for DOR approval and Government Approval (DA/GA) or "R" for DOR Approval and Government Conformance Review (DA/CR) designations.

Government approval is required for submittals with a "G" designation; Designer of Record Approval is required for submittals with a "D", "A" or "R" designations; submittals not having any designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section. When directed by the Government, the submittal register may be submitted via Section of 01 45 00.15 10 RESIDENTIAL MANAGEMENT SYSTEM CONTRACTOR MODE (RMS-CM) in lieu of the copy attached to this section. SpecsIntact is the software system used by Government to generate the Submittal Register that is loaded into RMS-CM.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3.1 Action Codes

1.3.1.1 Contractor Action Codes

DESIGN BUILD SUBMITTALS			
Submittal Classifications to be 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
D	Submittal requires Designer of Record Approval	D	DA
C	Submittal requires Government Conformance Review	C	CR
R	Submittal requires Designer of Record Approval and Government Conformance Review	R	DA/CR
A	Submittal requires Designer of Record Approval and Government Approval	A	DA/GA

Use Submittal Register Code "R" or "A" only when directed by the Contracting Officer.

1.4 DESIGN SUBMITTAL PACKAGES

Design submittal documents include construction drawings, specifications, design analysis, and other design deliverables. Provide specifications in sufficient detail to fully describe and demonstrate the quality of materials, the installation and performance of equipment, and the quality of workmanship. Comply with manufacturer's recommendations, unless indicated otherwise in RFP Technical Requirements for detailing and installation of all equipment and materials. Provide a design analysis for each design discipline of work and include all features with the necessary calculations, tables, methods, and sources used in determining equipment and material sizes and capacities, and provide sufficient information to support the design. Provide design submittal requirements in accordance with Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES and 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS.

Submit electronic design deliverables (i.e. drawings, specification, submittal register, design analysis) in Adobe Acrobat latest version.pdf file format, and include bookmarks for each design deliverable. Enable text to be searchable in all submitted files. Generally, list design submittals under SD-05 Design Data.

1.5 CLOSEOUT FINAL REPORT AND AS-BUILT/RECORD DRAWINGS

This includes both a draft and corrected final report. The report will contain a chronological outline of construction activities and required site documentation (i.e. All Issued for Construction Design Documents, Construction Submittals, Administrative Plans & QC Documents, Davis-Bacon, Final/Signed DD 1354's, O&M Manuals, Warranty Manuals, As-Built Drawings, Training/Demonstration Videos, Pre-final/Final Test/Inspection Reports to include punch-list and sign-in sheet, SF-30 signed modifications, RFI's, payments, Beneficial Occupancy letter & Memorandum, photos, KO Acceptance letter, and other items as directed by the Contracting Officer). Provide Closeout Final Report in electronic Adobe Acrobat format with bookmarks or as directed by Contracting Officer. See Section 01 78 39.00 24 AS-BUILT DRAWINGS for additional requirements.

1.6 SUBMITTAL CLASSIFICATION

1.6.1 Government Approved (G)

Government approval is required for any variations from the Solicitation or the Accepted Proposal and for 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."

1.6.2 Design-Build Submittal Classifications

1.6.2.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design; critical materials; any variations from the Solicitation, the Accepted Proposal, or the completed design requires either DA/CR or DA/GA approvals/reviews; equipment whose compatibility with the entire system must be checked; and other items as designated by the Contracting Officer. Provide the Government electronic copies designated hereinafter of all DOR approved submittals, unless directed otherwise. The Government

may review any or all Designer of Record approved submittals for conformance with the Solicitation, the Accepted Proposal, and the completed design. The Government will review all submittals designated as varying from the Solicitation or Accepted Proposal, as described below.

1.6.2.2 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the Solicitation. 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards, and contract requirements. Design data includes the design documents described in Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES .

1.6.2.3 Designer of Record Approved/Government Conformance Review (DA/CR)

1.6.2.3.1 Variations from the Accepted Design

DOR approval and the Government's conformance review are required for any proposed variation from the accepted design to ensure compliance with the contract. The Contractor and the DOR may discuss with the Contracting Officer's Representative a potential submittal that would propose a variation. However, the Government reserves the right to review the official submittal before providing an opinion. In any case, the Government will not formally agree to or provide a preliminary opinion on any variation without the DOR's approval or recommended approval. The Government reserves the right to reject any design, variation that may affect furniture, furnishings, equipment selections, or operational decisions that were made, based on the reviewed and accepted design.

1.6.2.3.2 Substitutions

In order to make a substitution for a "named" product, submit the details of the requested substitution for Government acceptance. The "named" product for the the accepted proposal could be identified by system, material, manufacturer, brand name, model number, or other specific identifier. Based on the submittal, the DOR must confirm and document that the substitution meets the contract requirements and is equal in function, performance, quality, and salient features to the "named" product. If the contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name, model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraphs: "DESIGNER OF RECORD APPROVED/GOVERNMENT APPROVED" and VARIATIONS.

1.6.2.4 Designer of Record Approved/Government Approved (DA/GA)

Both DOR and Government Approval and, where applicable, a contract modification are required before the Contractor is authorized to proceed with any proposed variation to the contract (the Solicitation or the Accepted Proposal), that constitutes a change to the contract terms. The Government reserves the right to accept or reject any such proposed variation.

1.6.3 For Information Only

Submittals not requiring Government approval will be for information

only. For Design-build construction all submittals not requiring DOR or 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."

1.6.4 Sustainability Reporting Submittals

Sustainability reporting submittals are as specified in Section 01 33 29 SUSTAINABILITY REPORTING.

Schedule submittals for these items throughout the course of construction as provided; do not wait until closeout.

1.7 PREPARATION

1.7.1 Transmittal Form

Use the ENG Form 4025 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 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. If there are multiple Item numbers listed on a particular ENG Form 4025 submittal, combine all submitted items for review into a single Adobe file with bookmarks (for ease of review). 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.

1.7.2 Submittal Format

1.7.2.1 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.

1.7.2.2 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.

Submit an electronic copy of drawings in PDF format.

1.7.2.2.1 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.

1.7.2.3 Format of SD-03 Product Data

Present product data submittals for each section. 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.

1.7.2.3.1 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.

1.7.2.3.2 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.

1.7.2.3.3 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.

1.7.2.4 Format of SD-04 Samples

1.7.2.4.1 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.

1.7.2.4.2 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.

1.7.2.4.3 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.

1.7.2.5 Format of SD-05 Design Data

Provide design data and certificates on 8 1/2 by 11 inch page size.

1.7.2.6 Format of SD-06 Test Reports

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.7.2.7 Format of SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inch page size.

1.7.2.8 Format of SD-08 Manufacturer's Instructions

Present manufacturer's instructions submittals for each section. 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.

1.7.2.8.1 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.

1.7.2.9 Format of SD-09 Manufacturer's Field Reports

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.7.2.10 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.7.2.11 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.

1.7.3 Source Drawings for Shop Drawings

1.7.3.1 Source Drawings

The entire set of source drawing files (DWG or DGN) 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.

1.7.3.2 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).

1.7.4 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. 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. All documents must make use of optical character recognition (OCR) routines to make text searchable and selectable, so that the text can be copied. 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.

E-mail electronic submittal documents smaller than 10MB to an e-mail address as directed by the Contracting Officer, unless directed otherwise by COR. Provide electronic documents over 10 MB on an optical disc or through an electronic file sharing system, such as secure ftp site or DoD SAFE located at the following website: <https://safe.apps.mil/>. Use of the Government web application must be initiated by the Government, unless Contractor has a Government CAC card. This Government web application restricts the number of days files are available to download.

1.8 QUANTITY OF SUBMITTALS

Submittals are to be transmitted electronically, unless directed otherwise.

1.8.1 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.

1.9 INFORMATION ONLY SUBMITTALS

Submittals without an action code must be certified by the QC manager and submitted to the Contracting Officer for information-only. 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. For Design-Build construction, the Government will retain electronic copies of information-only submittals.

1.10 PROJECT SUBMITTAL REGISTER

A sample Project Submittal Register showing submittals required by the specifications is attached to this section as "Project Submittal Register."

1.10.1 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.

1.10.2 Design-Build Submittal Register

The Designer of Record develops a complete list of submittals during design and identify required submittals in the specifications, and use the list to prepare the Submittal Register. The list may not be all inclusive and additional submittals may be required by other parts of the contract. Complete the submittal register and submit it to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with Government action codes. Revise the submittal register when the progress schedule is revised and submit both for approval.

1.10.3 Preconstruction Use of Submittal Register

Submit the submittal register as an electronic database, using the submittal management program furnished to Contractor, unless directed otherwise by COR. 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 database 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.

1.10.4 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.

1.10.5 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.

1.10.6 Action Codes

See paragraph Action Codes above.

1.10.7 Delivery of Copies

Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request, unless a paper copy is requested by the Contracting Officer. Provide an updated Submittal Register monthly regardless of whether an invoice is submitted.

1.11 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.

1.11.1 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. When contemplating a variation that results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.11.2 Proposing Variations

When proposing variations, deliver a written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

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.

1.11.3 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.

1.11.4 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.

1.12 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 20 calendar days for review and approval of submittals for 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 20 calendar days after the date of submission.

The Government review period for each construction submittal does not begin until the submittal is delivered via RMS CM. Contract compliance for all submittals are the Contractor's responsibility. Government acceptance or receipt acknowledged does not remove this responsibility for contract compliance on any construction submittal.

1.12.1 Government Reviewed Design

The Government will review design submittals for conformance with the technical requirements of the Solicitation. Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLE/PROCEDURES covers the design submittal and review process in detail. Government review is required for variations from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the DOR's design documents do not include enough detail to ascertain contract compliance. The Government may, but is not required to, review extensions of design such as structural steel or reinforcement shop drawings.

1.13 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. An electronic copy of the submittal will be retained by the Contracting Officer and an electronic copy of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be identified and returned, as described above. The Government may process submittals in the RMS CM System.

1.13.1 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.

1.14 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.

1.15 APPROVED SUBMITTALS

The Contracting Officer's 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. the design, general method of construction, materials, detailing, and other information appear to meet the Solicitation and Accepted Proposal.

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 within 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.

1.16 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.

1.17 WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made unless all required DOR approvals or required Government approvals have been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information-only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.18 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

For Design-Build construction, both the Contractor QC manager and the DOR are to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION

DRP Formal Training Unit Bldg 631 PN 503730 - Grand Forks AFB, ND

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/	APPROVING AUTHORITY				MAILED TO CONTR/	REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 14 00	SD-01 Preconstruction Submittals														
			Project Security and Site Access	1.4	G RO												
			Management Plan (SSAMP)														
		01 30 00.24	SD-01 Preconstruction Submittals														
			Equipment Room Drawings	1.24	G RO												
			Usace Bim Project Execution	1.34	G RO												
			Plan (Usace Pxp) Template														
		01 32 01.00 10	SD-01 Preconstruction Submittals														
			Project Scheduler Qualifications	1.3	G AO												
			Preliminary Project Schedule	3.4.1	G AO												
			Initial Project Schedule	3.4.2	G AO												
			Periodic Schedule Update	3.6.2	G AO												
		01 33 00	SD-01 Preconstruction Submittals														
			Submittal Register	1.10	G												
		01 33 29	SD-01 Preconstruction Submittals														
			Preliminary High Performance	1.5.3.2	G												
			and Sustainable Building Checklist														
			Sustainability Action Plan	1.4.1	G												
			Preliminary Sustainability	1.5.3.2	G												
			eNotebook														
			SD-05 Design Data														
			Interim Design High Performance	1.5.3.2	G												
			and Sustainable Building Checklist														
			Interim Design Sustainability	1.5.3.2	G												
			eNotebook														

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		01 33 29	Final Design High Performance and Sustainable Building Checklist	1.5.3.2	G												
			Final Design Sustainability eNotebook	1.5.3.2	G												
			SD-06 Test Reports														
			Third Party Certification Design Compliance Report	1.5.3.2	G												
			SD-11 Closeout Submittals														
			Final High Performance and Sustainable Building Checklist	1.5.3.2	G												
			Final Sustainability eNotebook	1.5.3.2	G												
			Bio-Based Products														
			Recycled Content														
			Certification of EPA Designated Items	1.6.18.1													
			Certification of USDA Designated Items														
			Amended Final Sustainability eNotebook		G												
			Amended Final High Performance and Sustainable Building Checklist		G												
			Third Party Certification Certificate, Assessment, or Validation and Compliance Report	3.2	G												
		01 33 39.00 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 33 39.00 10	Advanced Modeling Project Execution Plan (PxP)	1.4.1	G DO												
			PxP Demonstration	1.4.2	G DO												
			SD-11 Closeout Submittals														
			Record Advanced Modeling Submittal		G DO												
			As-built Drawings		G RO												
		01 35 26	SD-01 Preconstruction Submittals														
			Accident Prevention Plan (APP)	1.7	G RO												
			Accident Prevention Plan (APP)	1.7.1	G RO												
			SD-06 Test Reports														
			Monthly Exposure Reports	1.4													
			Notifications and Reports	1.12													
			Accident Reports	1.12.2	G AO												
			LHE Inspection Reports	1.12.3													
			SD-07 Certificates														
			Crane Operators/Riggers	1.6.1.4													
			Standard Lift Plan	1.7.3.1	G RO												
			Critical Lift Plan	1.7.3.2	G RO												
			Activity Hazard Analysis (AHA)	1.8													
			Certificate of Compliance	1.12.4													
			License Certificates	1.13													
		01 41 26.06 24	SD-01 Preconstruction Submittals														
			Contractor's NOI	3.2.1													
			Storm Water Pollution Prevention Plan	3.2.3	G RO												

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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	SD-01 Preconstruction Submittals														
			Contractor Quality Control (CQC) Plan	3.2	G RO												
			Additional Requirements for Design Quality Control (DQC) Plan	3.2.2	G RO												
			SD-05 Design Data														
			Discipline-Specific Checklists	3.2.2													
			Design Quality Control														
			SD-06 Test Reports														
			Verification Statement	3.9													
		01 57 20.00 10	SD-01 Preconstruction Submittals														
			Environmental Protection Plan	1.7	G RO												
		01 57 23	SD-07 Certificates														
			Mill Certificate or Affidavit	2.1.3													
		01 74 19	SD-01 Preconstruction Submittals														
			Construction Waste Management Plan	1.7	G RO												
			SD-06 Test Reports														
			Quarterly Reports	1.9.2													
			Annual Report	1.9.3													
			SD-11 Closeout Submittals														
			Final Construction Waste	1.10	G RO												
			Diversion Report														
		01 78 23	SD-10 Operation and Maintenance														
			Data														
			O&M Database		G RO												

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 78 23	Training Plan	3.1.1	G RO												
			Training Outline	3.1.3	G RO												
			Training Content	3.1.2	G RO												
			SD-11 Closeout Submittals														
			Training Video Recording	3.1.4	G RO												
			Validation of Training Completion	3.1.6	G RO												
		01 78 24.00 10	SD-01 Preconstruction Submittals														
			Facility Data Project Execution Plan	1.5.1	G RO												
			FDPxP Coordination Meeting	1.5.2.2	G RO												
			Submittal Demonstration Meeting	1.5.2.3	G RO												
			SD-11 Closeout Submittals														
			Preliminary BRED Template and Report	2.2.5	G RO												
			Preliminary BRED Template and Report	3.1	G RO												
			Preliminary BRED Template and Report	3.1	G RO												
			Final BRED Template and Report	2.2.6	G RO												
			Final BRED Template and Report	2.2.7	G RO												
			Final BRED Template and Report	3.1	G RO												
			Final BRED Template and Report	3.2	G RO												
			Final BUILDER Data Upload	2.2.7	G RO												
			Final BUILDER Data Upload	3.2	G RO												
		01 78 36.00 24	SD-11 Closeout Submittals														
			Equipment Warranty Booklet	1.2.5													

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 78 39.00 24	SD-03 Product Data														
			100 Percent Preliminary As-Built Drawings	1.8.2	G RO												
			SD-11 Closeout Submittals														
			Final As-Built Drawings	1.8.3	G RO												
			Sustainability Documentation	1.5.4	G DO												
		01 86 25	SD-01 Preconstruction Submittals														
			Cybersecurity Subject Matter Expert (Qualifications)	1.7	G DO												
			Contractor Personnel Requirements	1.8	G DO												
			Contractor Computer Cybersecurity Compliance Statements		G DO												
			Contractor Temporary Network Cybersecurity Compliance Statements		G DO												
			SD-02 Shop Drawings														
			MANUFACTURER DOCUMENTATION	3.9	G DO												
			TESTING AND COMMISSIONING REQUIREMENTS	3.10	G DO												
		01 86 26	SD-06 Test Reports														
			Cable Installation Plan and Procedure	2.9.1	G DO												

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 91 00.15 10	SD-01 Preconstruction Submittals														
			Commissioning Firm	1.8	G												
			Lead Commissioning Specialist	1.8.1	G												
			Technical Commissioning Specialists	1.8.2	G												
			Commissioning Firm's Contract	1.8	G												
			SD-05 Design Data														
			Design Phase Commissioning Plan	3.1.2	G												
			SD-06 Test Reports														
			Design Review Report	3.1.3	G												
			Interim Construction Phase Commissioning Plan	3.2.2.1	G												
			Final Construction Phase Commissioning Plan	3.2.2.2	G												
			Pre-Functional Checklists	3.2.4.2	G												
			Issues Log	1.10													
			Commissioning Report	3.3	G												
			Post-Construction Trend Log Report	3.4.1	G												
			SD-07 Certificates														
			Certificate of Readiness	1.11	G												
			SD-10 Operation and Maintenance Data														
			Training Plan	3.2.5	G												
			Training Attendance Rosters	3.2.5	G												

U.S. Army Corps of Engineers (USACE) TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE For use of this form, see ER 415-1-10; the proponent agency is CECW-CE.					DATE		TRANSMITTAL NO.	
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <i>(This section will be initiated by the contractor)</i>								
TO:			FROM:		CONTRACT NO.		CHECK ONE: <input type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____	
SPECIFICATION SEC. NO. <i>(Cover only one section with each transmittal)</i>			PROJECT TITLE AND LOCATION			THIS TRANSMITTAL IS FOR: <i>(Check one)</i> <input type="checkbox"/> FIO <input type="checkbox"/> GA <input type="checkbox"/> DA <input type="checkbox"/> CR <input type="checkbox"/> DA/CR <input type="checkbox"/> DA/GA		
ITEM NO. <i>(See Note 3)</i> a.	DESCRIPTION OF SUBMITTAL ITEM <i>(Type size, model number/etc.)</i> b.	SUBMITTAL TYPE CODE <i>(See Note 8)</i> c.	NO. OF COPIES d.	CONTRACT DOCUMENT REFERENCE		CONTRACTOR REVIEW CODE g.	VARIATION <i>Enter "Y" if requesting a variation (See Note 6)</i> h.	USACE ACTION CODE <i>(Note 9)</i> i.
				SPEC. PARA. NO. e.	DRAWING SHEET NO. f.			
REMARKS				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	
SECTION II - APPROVAL ACTION								
ENCLOSURES RETURNED <i>(List by item No.)</i>			NAME AND TITLE OF APPROVING AUTHORITY			SIGNATURE OF APPROVING AUTHORITY		DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
2. Each Transmittal shall be numbered consecutively. The Transmittal Number typically includes two parts separated by a dash (-). The first part is the specification section number. The second part is a sequential number for the submittals under that spec section. If the Transmittal is a resubmittal, then add a decimal point to the end of the original Transmittal Number and begin numbering the resubmittal packages sequentially after the decimal.
3. The "Item No." for each entry on this form will be the same "Item No." as indicated on ENG FORM 4288-R.
4. Submittals requiring expeditious handling will be submitted on a separate ENG Form 4025-R.
5. Items transmitted on each transmittal form will be from the same specification section. Do not combine submittal information from different specification sections in a single transmittal.
6. If the data submitted are intentionally in variance with the contract requirements, indicate a variation in column h, and enter a statement in the Remarks block describing the detailed reason for the variation.
7. ENG Form 4025-R is self-transmitting - a letter of transmittal is not required.
8. When submittal items are transmitted, indicate the "Submittal Type" (*SD-01 through SD-11*) in column c of Section I.
Submittal types are the following:

SD-01 - Preconstruction	SD-02 - Shop Drawings	SD-03 - Product Data	SD-04 - Samples	SD-05 - Design Data	SD-06 - Test Reports
SD-07 - Certificates	SD-08 - Manufacturer's Instructions	SD-09 - Manufacturer's Field Reports	SD-10 - O&M Data	SD-11 - Closeout	
9. For each submittal item, the Contractor will assign Submittal Action Codes in column g of Section I. The U.S. Army Corps of Engineers approving authority will assign Submittal Action Codes in column i of Section I. The Submittal Action Codes are:

A -- Approved as submitted.	F -- Receipt acknowledged.
B -- Approved, except as noted on drawings. Resubmission not required.	X -- Receipt acknowledged, does not comply with contract requirements, as noted.
C -- Approved, except as noted on drawings. Refer to attached comments. Resubmission required.	G -- Other action required (<i>Specify</i>)
D -- Will be returned by separate correspondence.	K -- Government concurs with intermediate design. (<i>For D-B contracts</i>)
E -- Disapproved. Refer to attached comments.	R -- Design submittal is acceptable for release for construction. (<i>For D-B contracts</i>)
10. Approval of items does not relieve the contractor from complying with all the requirements of the contract.

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 33 00.32

DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES

10/06; Rev 03/22

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SECTION 01 33 00.32

DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES
10/06; Rev 03/22

PART 1 GENERAL

Attachments: Attachment A, Design Certification and Transmittal Letter
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Transmittal Form
Example Drawing Title Block Information Key

1.1 SUMMARY

a. Design

Develop and submit a design including drawings, specifications, design analysis and any other required design deliverables and distribute design deliverables per the requirements in this section. See Section 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS and Section 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS for specific requirements related to each design discipline.

Use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for site development, energy, water, material selection, indoor environmental quality, and waste diversion. Ensure incorporation of these goals in project delivery. Consider all stages of the project lifecycle, including deconstruction, rehabilitation, re-purposing, or demolition.

b. Construction

Distribute the construction set of design deliverables, DD Form 1354 and as-built drawings as described herein. Edit the technical guide specifications using the construction submittal classifications defined below. As necessary, revise accepted design during construction per the instructions in this section.

1.2 APPLICABLE REFERENCES

The references listed below form a part of this specification to the extent referenced. The design publications listed below shall be used as sources of criteria for the design. The most current edition of the code or standard (with errata and addenda) available at the RFP proposal submission deadline shall be used as criteria for the design - unless noted otherwise. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

1.2.1 THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI)

CSI Masterformat 2016 Master List of Section Titles and Numbers

1.2.2 NATIONAL CAD STANDARDS

The National CAD Standards can be found at:
<https://www.nationalcadstandard.org/ncs6/>. See Section 01 78 39.00 24 AS-BUILT DRAWINGS and Section 01 33 39.00 10 ADVANCED MODELING

(BIM/CIM/GIS/CAD) REQUIREMENT for a summary of CAD and general guidelines concerning file format and font requirements. Furnish the CAD software for contractor use meeting the requirements of the RFP.

1.2.3 WEB SITES

In addition to the web sites listed in this section, other RFP Sections may list web sites containing design criteria references used in this solicitation package.

NOTE: FOR ITEMS BELOW, REFERENCES TO RECEIVING APPROVAL FROM OTHER GOVERNMENT AGENCIES FOR ALTERNATIVE DESIGNS ARE NOT APPLICABLE TO THIS PROJECT. THE CONTRACTOR IS THE DESIGNER WHEN READING THESE DOCUMENTS.

CONSIDER ALL ITEMS LISTED BELOW A PART OF THE RFP SOLICITATION DOCUMENT (AS APPLICABLE) AND THE RESULTANT CONTRACT.

(a) OBTAIN UNIFIED FACILITIES CRITERIA (UFC), TECHNICAL MANUALS (TM), TECHNICAL INSTRUCTIONS (TI), AIR FORCE MANUALS (AFM), ENGINEERING TECHNICAL LETTERS (ETL), ARMY ARCHITECTURAL AND ENGINEERING DESIGN CRITERIA (AEI), SUSTAINABLE DESIGN DOCUMENTS, AND MILITARY HANDBOOKS (MIL HANDBK) from the following internet addresses:

<http://www.publications.usace.army.mil/>.

<http://www.wbdg.org/>

Additional web sites are as follows:

AIR FORCE DESIGN CRITERIA:

<http://www.e-publishing.af.mil/>

(b) UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

This includes UFGS sections referenced, but not provided in the solicitation and other UFGS sections required in developing the project specifications. Unless noted otherwise, download these Guide sections in SpecsIntact SGML (zipped) file format at the following internet address:

http://www.wbdg.org/ccb/browse_org.php?o=70

Guide specification numbers and titles referenced in the solicitation may vary from the actual specification numbers and titles available at the website listed above.

Download SpecsIntact software at the following internet address:

<http://specsintact.ksc.nasa.gov/Software/software.shtml>

Use SI Version 5.0 or later. Select the new unified submittal format for file format.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-2909

(2012) Engineering and Design --
Geospatial Data and Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-300-02	(2014, with Change 3, 2021) Unified Facilities Guide Specifications (UFGS) Format Standard
UFC 1-300-08	(2009, with Change 2, 2011) Criteria for Transfer and Acceptance of DoD Real Property

1.3 DEFINITIONS

1.3.1 Contractor

Firm or company awarded the design and construction of Renovation Bldg. 631 located at Grand Forks AFB, North Dakota.

1.3.2 Design

Documents or deliverables, as defined in this section, prepared by or under the direct supervision of registered professional architects and engineers and proposed to meet the requirements of this solicitation.

1.3.3 Design Drawings

Documentation showing in graphic and quantitative form the extent, design, location, relationships, and dimensions of the construction to be provided by the Contractor. (Note: Do not provide Shop Drawings, as defined in Section 01 33 00, "Submittals Procedures" until after the Government determines that the design drawings are satisfactory for construction.)

1.3.4 Designer of Record (DOR)

Professional Registered members of the Contractor's Design-Build team that check, approve, sign, date, and certify, prior to submitting the deliverables to the Government, that the D-B design submittals comply with the contract requirements.

The DOR's stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage. The DOR(s) are responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional design responsibilities.

1.3.5 Request for Proposal (RFP)

Documents furnished to prospective offerors containing proposal information and specifying criteria and project requirements for design and renovation of Bldg. 631 located at Grand Forks AFB, North Dakota. The documents include the RFP specifications, appendices, and the RFP concept drawings.

1.3.6 Advanced Modeling

A subset of geospatial technologies as defined in EM 1110-1-2909 to include BIM, CIM, GIS, and 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. See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS.

1.4 ORDER OF PRECEDENCE

See Section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS, paragraph "DESIGN-BUILD CONSTRUCTION CONTRACTS".

1.5 QUALITY ASSURANCE

If, because of reasons beyond the control of the construction or design firm, the named individuals submitted for approval are unable to fulfill this obligation, present replacement personnel with similar skills and experience for acceptance by the Contracting Officer. Ensure replacement individuals have qualifications and experience meeting or exceeding those identified in the proposal. Obtain the Contracting Officer's written consent before making any substitution for these designated personnel.

1.5.1 Construction Personnel Experience

See Section 01 45 00.00 10 QUALITY CONTROL and Section 00 22 00 PROPOSAL SUBMISSION REQUIREMENTS, INSTRUCTIONS AND EVALUATION.

1.5.2 Designer Qualifications and Experience

See below for required experience of Design Personnel. Submit resumes and credentials demonstrating compliance with these requirements as part of the Design Quality Control Plan required in Section 01 45 00.00 10 QUALITY CONTROL.

Required Design personnel, in addition to the ones required by the Phase 1 solicitation, are listed below. Ensure designers will be immediately available for design services at the time of Notice to Proceed:

- a. Registered Mechanical Engineer
- b. Registered Electrical Engineer
- c. Interior Designer (NCIDQ)
- d. BIM Manager (certification not required, but submit proof of experience)
- e. Registered Civil Engineer

1.6 SUBMISSION OF DESIGN DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES

1.6.1 Design Certification

Within each design submittal, certify that all design documents (after construction award) comply with this RFP, the Division 1 specifications, and mandatory requirements of the UFGS and designated CEGS (Omaha District Specifications). The criteria specified in this RFP are binding contract criteria and in case of any conflict, after award, between the RFP criteria and Contractor's submittals, the RFP criteria will govern unless there is a written and signed agreement between the Contracting Officer and the Contractor waiving a specific requirement. See paragraph "ORDER OF PRECEDENCE" above. Include certification similar to Attachment A of

this section with the letter of transmittal for each design submittal (including the 100% corrected design (backcheck) submittal) stating that the submittal (plans, specifications, design analysis, etc.) complies with the requirements above.

1.6.2 Deviations

Identify deviations from the RFP technical requirements in the letter of transmittal and design certification letter. The Contracting Office will consider and may approve deviations from the RFP technical requirements if the changes result in a significant improvement to the project or exceed the minimum RFP technical requirements.

1.6.3 Field Inspection

Field verify conditions which are significant to design. Research and obtain all necessary existing facility as-built drawings and reproduce as necessary, and discuss status with knowledgeable personnel. Include this information in the design documents.

1.6.4 Drawings

1.6.4.1 Software Requirements

Develop and maintain Design and As-Built requirements in accordance with Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS and Section 01 78 39.00 24 AS-BUILT DRAWINGS, respectively. The Government will provide files developed for the RFP for the designer's optional use. The files developed for the RFP may not comply with the design requirements listed herein. Use of the concept model does not limit compliance with BIM or As-Built requirements in this contract.

1.6.4.2 RFP Drawings

The Government will furnish files as described in Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS. See that specification for caveats and limitations associated with government-furnished material.

1.6.5 Design Documents

Include construction drawings, specifications, design analysis, and other design deliverables as indicated in Sections 01 33 00.36 60% DESIGN REQUIREMENTS and 01 33 00.38 100% DESIGN REQUIREMENTS. Include sufficient detail in the specifications to fully describe and demonstrate the quality of materials, the installation and performance of equipment, and the quality of workmanship. Comply with the manufacturer's recommendations for detailing and installation of all equipment and materials. Include in the Design Analysis each discipline of work and all features with the necessary calculations, tables, methods and sources used in determining equipment and material sizes and capacities. Provide sufficient information to support the design.

1.6.6 Post-Award and Initial Design Kickoff Meeting

After contract award, coordinate an appropriate time for and conduct a design initiation/kickoff meeting with appropriate Government stakeholders at the project site. Discuss and validate the project scope as defined in the RFP. Collect information relative to the initiation of the design, current state of the project facility/site, mission requirements,

criteria, and stakeholder and project requirements. Ensure all relevant Design-Build designers and construction personnel participate. Document and submit meeting minutes related to the meeting. Submit any variances, deviations, and/or modifications to scope as defined by this RFP must be processed accordingly. The primary purpose of the meeting is to make sure any needs are assigned and due dates established, as well as points of contact identified.

As a minimum, address the following during the conference:

- a. The Government will introduce the Government project delivery team members, facility users, facility command representatives, and installation representatives.
- b. Introduce key personnel, major subcontractors and other needed staff.
- c. Define expectations and duties of each participant.
- d. Develop a meeting roster with complete contact information including name, office, project role, phone, mailing and physical address, and e-mail address for distribution to all participants. Also, provide minutes of the meeting to all participants.
- e. Discuss basic contract administration requirements.
- f. Discuss expected project progress processes.
- g. Coordinate subsequent meetings required by this contract.

1.6.7 Meetings During Design

Bi-weekly meetings shall be coordinated by the design-build contractor. The intent of the meetings is to provide dialogue between the designers of record, the construction contractor, the customer, base CES, and USACE in order to facilitate the design process, answer and resolve questions, and provide a smooth transition into construction. The contractor shall prepare a brief agenda outlining topics for discussion at least two days prior to the meeting. Meetings shall be virtual via MS Teams or WebEx so that government employees can attend and view presentations.

1.6.8 Design Reviews

During the design, conduct a minimum of two design reviews at Grand Forks AFB for the 60 percent and the 100 percent completion stages, unless directed otherwise. A backcheck review will follow the Corrected 100 percent design. Once the Government reviews the Corrected 100 percent design and determines it to be satisfactory for the purpose of beginning construction, prepare and distribute sets of documents for construction. Attend the design reviews, visit the site, and make other trips as necessary during the design to accomplish the work.

1.6.9 Document Packaging

See Section 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS for the 60 percent design submittal requirements. (See Section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS, paragraph: Sequence of Design-Construction for optional packaging and submission of design documents). Stamp these documents "For Review Only - 60% Design - Not For

Construction"; also include this stamp on each sheet of the drawings.

See Section 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS for the 100 percent design submittal requirements. Stamp these documents "For Review Only -100% Design - Not For Construction", also include this stamp on each sheet of the drawings.

Stamp the backcheck design submittal(s) after the Government review of the 100 percent complete design "100% Corrected Design - Not For Construction"; also include this stamp on each sheet of the drawings. The 100% Corrected Design submittal is for making corrections resulting from review comments and for preparing the final project documents. The Government will grant no additional time for completion of the contract due to insufficient design submittals. See paragraph "Government Design Review and Acceptance" below for additional requirements.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 DRAWINGS

Prepare, organize, and present drawings in the format specified herein. Provide drawings complete, accurate and explicit enough to show compliance with the RFP requirements and to permit construction. Properly detail systems on drawings proposed to meet RFP performance specifications to ensure appropriate use, proper fit, compatibility of components and coordination with the design analysis and specifications. Coordinate drawings to ensure no conflicts exist between design disciplines and between drawings and specifications.

3.1.1 Drawings Format

Full size drawings are 22 inches x 34 inches. Half-size drawings are 11 inches x 17 inches. Ensure title block complies with the USA A/E/C. Sections 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS and 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS specify recommended drawing scales. Ensure the Cover Sheet of the drawings bears the stamp or seal and signature of the registered architect or appropriate engineer responsible for the work and proposed to meet the RFP requirements. Use the following drawing project code numbers on all border sheets for the design and construction drawings: GFND00100. FILE NUMBER on all border sheets for the design and construction drawings is to be the contract number determined at award and will be verified at the design kickoff meeting.

See attached Example Drawing Title Block Information Key.

3.1.2 Drawings Sequence

Arrange drawings by design discipline in accordance with National CAD Standards.

3.1.3 Drawings Required

Include a title sheet, index of drawings, legend and abbreviations, and soil borings (if applicable). See Sections 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS and 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS for discipline-specific requirements.

3.2 SPECIFICATIONS

3.2.1 Project Specifications

3.2.1.1 General Requirements

Develop project specifications incorporating the Division 1 Specifications furnished with this RFP; unedited Unified Facilities Guide Specifications (UFGS) current at the time of award; designated specification sections furnished with this RFP; and additional project specifications as needed not covered by UFGS. Organize project sections not based on UFGS in accordance with CSI MasterFormat and UFC 1-300-02.

Edit and process the specification using SpecsIntact software.

3.2.1.2 Technical Specifications

Use unedited UFGS and designated unedited CEGS sections for developing project specifications. Do not rewrite specification paragraphs and subparagraphs to lessen the quality of the original technical specification sections, unless directed otherwise. The technical guide specifications describe the type and quality of material and installation normally acceptable for Corps of Engineers Construction, and often represent specific agreement between the Corps and the applicable industry. Do not change the provisions of the technical guide specifications without justification. Identify in the design analysis under the appropriate design discipline justifications for additional materials. Do not include designer notes in any design submittals. Only delete bracketed choices and inapplicable items. Do not show revisions in the corrected 100 percent specifications submittal. Complete the editing of all options. Where designer notes are provided, edit the choice in accordance with the recommendations and guidance of the Notes, except where the RFP provides specific guidance.

Edit and expand the appropriate specifications to meet all project design requirements, current code requirements, and regulatory requirements. Provide non-proprietary, descriptive project specifications in compliance with the requirements in UFC 1-300-02. Do not provide proprietary information in the project specifications unless approved by the Contracting Officer.

3.2.1.3 Editing Technical Specifications (Designated CEGS or UFGS)

(1) Incorporating Established RFP Requirements into Guide Specifications

Where the edited RFP Division 01 provides specific requirements in regards to materials, methods and end function requirements, edit the UFGS and designated CEGS (Omaha) to reflect these requirements. The Government will not permit variations to these requirements, unless authorized as a design deviation by the Contracting Officer.

(2) Requirements of Guide Specifications Not Established By RFP Requirements

Where the RFP does not provide specific direction in regards to materials, methods and end function requirements, the final requirements will be a result of the completed design by the Contractor.

(3) ADDITIONS: If the specifications of the UFGS or designated CEGS does not cover a feature that is in the project, insert new sentences and/or paragraphs in the proper locations to adequately cover the feature of work. Do not use additions to lessen the quality of materials indicated by the specifications. If adding a new material, properly reference it in "Applicable Publications", "MATERIALS", "SUBMITTAL", "TESTS", and "INSTALLATION" paragraphs, as applicable.

(4) DELETION OF INAPPLICABLE TEXT MATERIAL, AS NECESSARY, TO TAILOR THE SPECIFICATIONS TO FIT THE PROJECT: After deleting all inapplicable paragraphs, subparagraphs, choices, and schedules from the body of the specifications (including but not limited to the correction of lists in "Submittals", "Tests", and "Installation" paragraphs), delete all nonapplicable references listed in the preceding "APPLICABLE PUBLICATIONS" and "MATERIALS" paragraphs. Do not use deletions to lessen the quality of materials indicated by the specifications.

(5) Do not remove any special code markings for submittals, references, tests or section references, unless the text is not required.

(6) REFERENCES TO SPECIFICATION SECTIONS. Coordinate section references, along with the technical requirements, to specific specification sections (number and title) within the project specifications. Revise section references (title and number) to reflect the titles and numbers of specification sections used.

(7) REFERENCES. Coordinate references or publications in the text of each specification with the references listed at the beginning of each section. See paragraph "Error Report Submission and Resolution" below. The SpecsIntact Software removes references or publications not referenced in the text from the Reference Article when printing from the Jobs menu.

(8) SUBMITTALS. Each section of the specifications includes a submittal paragraph which lists all applicable Contractor submittals. Properly mark submittals as outlined in the SpecsIntact documentation and in this section. SpecsIntact uses these codings for automatic generation of the Submittal Register. Do NOT delete these codings from the text, unless the submittal is not required. Make the Submittal Item text between the coding identical (word for word, including punctuation and spacing) to the paragraph text in the reference paragraph(s). Text may be either upper or lower case letters.

During the design phase, develop a complete list of required construction submittals in each technical specification. The list will become the Submittal Register for approval by the Contracting Officer Representative (COR). SpecsIntact generated the example Submittal Register in this Solicitation. Replace this example Submittal Register with the actual submittal register developed from the completed design specifications. This list is not all inclusive and additional submittals may be required as directed by the COR. Both the attached sample and the Contractor-generated submittal registers identify only the submittal section, type of submittal, description of item submitted, paragraph number related to submittal item (section submittal paragraph if none listed), submittal classification (G or FIO), and submittal reviewer identifier.

See Section 01 33 00 SUBMITTAL PROCEDURES, for complete instructions related to submittal descriptions, classifications, numbers, and submittal process.

(9) USE OF UFGS SECTIONS

Unless directed otherwise, use UFGS sections. UFGS sections are a joint effort of the U.S. Army Corps of Engineers (USACE), the Naval Facilities Engineering Command (NAVFAC), National Aeronautics and Space Administration (NASA) and the Air Force Civil Engineer Support Agency (AFCEA). In instances where more than one UFGS section addresses the same material or system requirement, as a general rule, use the Section developed by the USACE specification proponent. Available UFGS sections with the numbers ending ".00 10", ".00 20" or ".00 40" following the section number are sections that have not yet been unified by the different Government design agencies. The ending numbers designate the specification proponent (".00 10" is for USACE, ".00 40" for NASA and ".00 20" is for NAVFAC). Where UFGS sections include tailoring options for both the various proponents (Army, NASA and Navy), use the Army tailoring option. Where conflicts exist that cannot be resolved, contact the Contracting Officer to resolve the issue.

3.2.1.4 Developing Additional Project Specifications

Organize project sections not based on UFGS in accordance with CSI MasterFormat and UFC 1-300-02. Ensure these specifications conform to the applicable criteria requirements indicated in the solicitation. Write at the Mediumscope level of detail as described in CSI Masterformat. Use Mediumscope level section numbers and titles as identified in CSI Masterformat. Adjust section numbers which conflict with the specifications used in the Project Specifications. Use the same format as the CSI format specifications included in the UFGS (including the submittal paragraph).

Use of commercially-available guide specifications such as "SpecText" published by CSI and "MasterSpec" published by The American Institute of Architects is permissible, subject to the format, coding and submittal paragraph requirements. Change references to the "Architect/Engineer" and the "Owner" to refer to the "Government" or "Contracting Officer," as appropriate. Coordinate references, along with the technical requirements, to specific specification sections (number and title) within the project specifications. Revise section references (title and number) to reflect the titles and numbers of specification sections used.

3.2.1.5 Division 0 and 1 Sections

Include Division 0 and 1 specifications sections contained in the RFP as part of the project specifications without change, unless directed otherwise:

00 73 00 SPECIAL CONTRACT REQUIREMENTS,
01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS,
01 32 01.00 10 PROJECT SCHEDULE,
01 33 00 SUBMITTAL PROCEDURES,
01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING,
01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS,
01 35 26 GOVERNMENTAL SAFETY STANDARDS,

01 41 26.06 24 (NORTH DAKOTA) NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES
 01 45 00.00 10 QUALITY CONTROL,
 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
 01 57 20.00 10 ENVIRONMENTAL PROTECTION,
 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL
 01 62 35 RECYCLED / RECOVERED MATERIALS,
 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL,
 01 78 23 OPERATION AND MAINTENANCE DATA,
 01 78 24.00 10 FACILITY DATA REQUIREMENTS,
 01 78 36.00 24 WARRANTY OF CONSTRUCTION AND DESIGN,
 01 78 39.00 24 AS-BUILT DRAWINGS, and
 01 91 00.15 20 TOTAL BUILDING COMMISSIONING

The Government will furnish copies of these sections and other specifications included with the RFP upon request to the successful offeror in SpecsIntact. Include any amendment revisions issued into these sections. Provide any other Division 1 Specifications required by the Contract, including 01 42 00 SOURCES FOR REFERENCE PUBLICATIONS. Include additional specifications indicated elsewhere in the solicitation or required by the Contractor.

3.2.2 Format for Project Specifications

Submit a bundled specification package, including a cover page and table of contents, in PDF format for each design package. As a minimum, bookmark each specification section in the bundled package. Also, submit the source files, in the processing system format, used to create the PDF.

For the 60 percent and 100 percent design submittals, show specification revisions including text deletions and text insertions (i.e. print the 60% and 100% review specifications showing all insertions and deletions). Do not show revisions for the corrected 100 percent specifications (remove markings for insertion and deletion).

Include a Section Table of Contents within each specification section matching the page numbering of the specification section.

Make the Specifications Cover Page similar to the RFP Cover page and include:

- a. Project title, Project Number, activity and location
- b. Construction contract number
- c. Construction Contractor's name and address
- d. Design firm's name and address
- e. Names of design team members (Designers of Record) responsible for each Contractor prepared technical discipline of the project specification
- f. Name and signature of a Principal of the design firm

Include the appropriate Divisions using CSI format and the specification section numbers and titles contained in the project specifications in the Table of Contents.

3.2.3 Error Report Submission and Resolution

Submit the following SpecsIntact reports with the 100 percent and Corrected 100 percent design submittals: Address Verification, Reference Verification, Section Verification, Bracket Verification, Submittal Verification, Submittal Register and any other reports requested by the Contracting Officer. Reconcile references when printing reports. Submit the reports for review after correcting any errors initially displayed in these reports. In the reference verification reports, only fix errors consisting of a discrepancy with the issue date of a publication (i.e., NFPA 70, revise to the latest code requirement). Complete Address, Reference and Submittal Reconciliation prior to submittal of the 100 percent design.

3.2.4 Construction Submittals

See Section 01 33 00 SUBMITTAL PROCEDURES.

Include construction submittal types and products, including the submittal description numbers and data package numbers. When appropriate, use specific product terms instead of the generic product terms contained in the specifications sections (e.g., asphalt shingles, built-up roofing, EPDM single ply, etc. vs roof covering; concrete masonry units, brick, metal siding, etc. vs exterior skin; mineral fiber board, block, batt or blanket, polystyrene, polyurethane, polyisocyanurate board vs insulation).

3.2.4.1 Submittals Register (Form)

Prepare and maintain a Submittal Register. Prepare the Submittal Register (ENG Form 4025) using SpecsIntact Software.

Fill in columns "c" through "f" and submit with the 100 percent design submittal. The Government will return the Submittal Register to the Contractor along with the reviewed and accepted design.

Resubmit the Submittal Register as a construction submittal as required in Section 01 33 00 SUBMITTAL PROCEDURES. Provide an electronic copy of the accepted submittal register (NAVY4288.txt file), generated by the SpecsIntact software, three (3) working days prior to the pre-construction conference. Appropriate authorities will fill in remaining columns during construction.

3.3 DESIGN ANALYSES

Prepare design analyses (basis of design and calculations) for each design discipline. This section and Sections 01 33 00.36 60 PERCENT DESIGN SUBMITTALS and 01 33 00.38 100 PERCENT DESIGN SUBMITTALS contain specific requirements for technical content. Include a basis of design and calculations, as applicable, for each discipline. Present facts to demonstrate that the concept of the project is fully understood and that the design is based on sound engineering. For each discipline include:

a. A basis of design consisting of:

(1) An introductory description of the project concept which addresses the salient points of the design;

(2) An orderly and comprehensive documentation of criteria, rationale, assumptions and reasoning for system selection.

b. Calculations required to support the design.

c. Project Engineering Considerations and Instructions (ECI) for Final Design Analysis.

Do not make reference to the RFP solicitation to avoid stating the requirements for the basis for design.

3.3.1 Format

Include a cover page indicating the stage of design "PRELIMINARY DESIGN ANALYSIS" for 60 percent design submittal and "FINAL DESIGN ANALYSIS" for 100 percent design submittal, the project title "DRP Building 631 ", fiscal year and program funding "FY 23 MCAF", location "Grand Forks AFB, ND ", who prepared the design analysis "Prepared By:" followed by Name of AE and Construction Contractor, location of AE and Construction Contractor Office involved with the design, and construction contract number; table of contents; and bookmarks for each part of design analysis for quick reference. Indicate the volume number and total number of volumes for the project on the cover sheet. Provide a cover sheet for each volume. Submit design analyses prepared on 8 1/2 by 11-inch page size. Include all disciplines in one volume when possible, excluding calculations. Provide multiple volumes for individual disciplines, appropriately numbered, when required.

Use a decimal paragraph numbering system (i.e. 1, 1.1, 1.1.1, 1.1.1.1, etc.) for narratives. Do not copy the text from the RFP document sections, unless directed otherwise. Write in the same tense (Past or Present) for the entire design analysis. Include the part number and page numbering (consecutive page numbering for each part). Organize design analysis narrative into the following parts, as follows:

3.3.1.1 Part 1 - General Description.

Provide statements of purpose, authority and applicable criteria. Provide a description of the project and a summary of the economic factors influencing the choice of the civil, architectural, structural, mechanical, electrical, communications, fire safety, water supply, and wastewater disposal systems used in the project along with an indication of how initial and life costs were considered.

a. Purpose. Include a statement under the heading of "PURPOSE" that applies to the project

b. Authority. Confirm authorization statement with the USACE project manager after award.

c. Applicable Criteria. Provide a list of the general criteria that pertains to all disciplines used in the design. List specific criteria used in a particular engineering/architectural discipline in the text of the appropriate discipline in Part 2 of the design analysis. Reference such criteria accordingly.

d. Project Description. Provide a description of the project and summary of economic factors influencing the choice of materials and systems used in the project.

3.3.1.2 Part 2 - Design Requirements and Provisions.

Provide statements of factors considered in the design along with supporting justification of design decisions and design calculations. Include narratives for each of the following areas or disciplines. See Sections 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS and 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS for specific requirements.

- a. Civil
- b. Water Supply and Wastewater
- c. Architectural
- d. Interior Design
- e. Structural
- f. Mechanical
- g. Electrical
- h. Communications
- i. Fire Protection
- j. Environmental Protection, Compliance and Permits
- k. Health and Safety
- l. Sustainable Design

3.3.2 Calculations

Place all calculations in separate appendices and volume(s) as needed. Include a cover page for calculations similar to the design analysis narrative cover page, a table of contents, index page and a summary of criteria for each appendix on the first pages and the project title. Identify the project and location on every page of the calculations. Ensure all calculation pages are legible and photo-ready. Consecutively number each discipline (Example: A-1, A-2, A-3 etc. for Water Supply and Wastewater Calculations and B-1, B-2, B-3, etc. for Structural Calculations) and include the date. Cite criteria for calculations, rationale, and formulae by publication number, title, edition and page number. Include the names of the persons originating and checking the calculations on the cover page and each page of the calculations. Ensure a registered professional engineer other than the originator checks the calculations. In addition, include the signature and seal of the appropriate registered professional engineer responsible for the work appears on the cover page of the calculations for each discipline. List subtopics (e.g. for Structural - Loads, Materials, References, Wind Analysis, Footing Design, Wall Design, Column Design, etc.) on an index page for each appendix with page numbers corresponding to the calculations.

Use consecutive page numbers and identify computer printouts similar to the calculations. Identify the computer program name, source, and version. Provide all schematic models used for computer input.

3.3.3 Engineering Considerations and Instructions (ECI) for Field Personnel

3.3.3.1 Separate Appendix

Under a separate appendix in the Final Design Analysis, include the following items:

- a. Features critical to the quality of the final construction product requiring special attention.
- b. Submittals requiring special attention during construction.
- c. Special user requirements or instructions.
- d. Assumed field conditions, pertinent significant aspects, or critical phases of the project used as a basis of project design.

3.3.3.2 Format

Include the following information in a format similar to the below for Engineering Considerations and Instructions (ECI's):

"ENGINEERING CONSIDERATIONS AND INSTRUCTIONS

Project Name: _____

Location: _____

Designer Name: _____ Phone: _____

Discipline: _____

Follow these Engineering Considerations and Instructions (ECI's) during the construction of the above project. If you have any questions, contact the appropriate Design-Build designer."

3.3.3.3 Distribution of ECI's

After acceptance of the 100 percent corrected design and prior to the start of construction, e-mail a copy of the ECI's to the appropriate U.S. Army Corps of Engineer's Field representative with a copy furnished to the appropriate individuals identified at either the pre-design or pre-construction conference.

3.3.4 Requests for Information, Meeting Minutes and Comments

Include copies of Requests for Information (RFI) as an appendix to the design analysis. Include an index of each RFI documenting the RFI number, the date given to Government, the date answered, and the Action Response provided by the Government.

Include a copy of all meeting minutes and design review comments (if any) with action responses as an appendix to the design analysis.

Include page numbering and formatting in all appendices for RFI's, Meeting Minutes, and design review comments similar to Calculations listed above.

3.4 DESIGN CERTIFICATION

Provide certification signed by an officer of the Contractor's company attesting that the drawings, specifications, and design analyses prepared for the construction of the facility meet the requirements of the RFP. Include the certification in the submission of the design documents along with names and disciplines for the designers of record. Include a list of deviations (variations) from the solicitation or accepted final design as part of this design certification. Prepare the design certification and transmittal letter in the format shown in Attachment A or Attachment B included at the end of this section.

3.5 REVIEW BY GOVERNMENT AGENCIES

3.5.1 Distribution of Design Documents for Conformance Review

(a) Send review documents to ensure Government receipt thirty (30) days prior to review conferences. The documents will be in their then-present "on-board" design status (except for the 100% design submittal). See below for review agencies and required quantities. Include an index of contents in all documents. Continue work during the review period between the 60% design submission and the 60% design review conference.

Ensure work is 100% complete when the 100% design is submitted. Do not continue design work during the review period between the 100% design submission and the 100% design review conference. Indicate distribution by use of the "ATTN" code shown in the address in the transmittal letter. Submit a complete package (i.e. drawings, specifications, DA, etc.) including the items listed below.

(b) If the Government requires more time than the thirty (30) days given, prior to either of the 60% or 100% review conferences, the Government will grant an extension of time equal to the number of calendar days of delay.

(c) The Government requires fourteen (14) days to review 100 Percent Corrected Design submittals **after receipt** of these documents. If the Government requires additional review time, it will grant an extension of time equal to the number of calendar days of delay.

3.5.1.1 Design Submittal Items

Submit electronic copies of the following items as applicable for each design submittal: design analysis, design analysis calculations and appendices, specifications, specification error reports, submittal register, color boards, DD Form 1354, environmental protection plan, backcheck review comments, sustainability tracking report, design certification letter with deviations, and engineering considerations and instructions (ECI) in an Adobe Acrobat XI .pdf format in the quantity indicated by the '**EMedia**' designation and one (1) hard copy of each document contained on the electronic media per office per submittal listed below unless indicated otherwise. Use bookmarks with titles and ensure the text is searchable. Make each design submittal item and submittal item component easy to find (i.e. each specification section, chapters and appendices of design analysis, and each submittal item). Ensure submittals are legible and permit ease of design review. Poor quality scans of as-built drawings or other materials are unacceptable. Failure to meet this requirement on one design submittal may result in requiring all future submittals and resubmittals to be hard copy, at no additional cost to the Government.

The submittal items listed below identify the different design submittals required throughout the design process and select submittals required during and at the completion of construction. Each submittal item has an abbreviation as shown below used in conjunction with the number of required copies.

Submit hardcopies of any items identified separately below from the required "Emedia" submittal.

SUBMITTAL ITEM - ABBREVIATION

Drawings (1/2 size) - **Dwg-1/2**

Electronic Media - **EMedia**

Specifications - **Specs**

Color Boards - **ColBd**

3.5.1.2 Activity Distribution Addresses

Engineering Division
Attn: CENWO-PM-M (Chuck Newman)
U.S Army Engineer District, Omaha
1616 Capitol Avenue
Omaha, NE 68102-4901

DAF/RCO
Attn: SAF/AQ (Randy Brown)
272 Luke Avenue
Washington DC 20032

319 Civil Engineering Squadron
ATTN: 319 CES/CENM (Lance Landon)
525 Tuskegee Airmen Blvd
Grand Forks AFB, ND 58205

3.5.1.3 60 Percent Design Distribution

See paragraphs above explaining Submittal Abbreviation Codes and Activity Distribution Addresses.

Activity / Submittal Item	CENWO-PM-M	DAF/RCO	319 CES
Dwg-1/2	0	1	1
EMedia	1	1	1
ColBd	1	1	1
Specs	0	1	1

60 PERCENT SUBMITTAL NOTES:

(1) Show deletions and insertions (Revisions On) for all specifications. Include Process and Print Options for each section as follows (check boxes under):

- "Sections" Print/Process Sections and Renumber Paragraphs
- "Reports" a Section Table of Contents (Include Without Scope and Combine sections and section tables of contents)
- "Options" Section Dates shown, Units of Measure as English, Revisions shown, Start Page Numbering with "1", Restart for each section, Use orphan control
- "Header/Footer" (jobtitle) and (jobname) as a Header and Section number and Page number as a footer (similar to format shown on this section of the RFP).

(2) Electronic Media Drawings:
Submit drawings electronically in CAD and PDF format as well as on paper. Provide the following drawings on the '**EMedia**':

- interior design furniture footprint
- architectural composite and area floor plans, and reflected ceiling plans
- electrical lighting, thermostat, power and communication drawings

(3) Include:

- electronic color boards in each submittal that show colors of all proposed exterior and interior finishes. In addition, provide actual color boards in the quantity indicated in the submittal distribution list; these color boards shall show actual color samples of all proposed exterior and interior finishes.
- electronic FF&E in each submittal that shows colors of all proposed finishes and fabrics. In addition, provide FF&E binders in the quantity indicated in the submittal distribution list; these binders shall have actual color samples of all finishes and fabrics..

3.5.1.4 100 Percent Design Distribution

See paragraphs above explaining Submittal Abbreviation Codes and Activity Distribution Addresses.

Activity / Submittal Item	CENWO-PM-M	DAF/RCO	319 CES
Dwg-1/2	0	1	1
EMedia	1	1	1
ColBd	1	1	1
Specs	0	1	1

100 PERCENT SUBMITTAL NOTES:

(1) Show deletions and insertions (Revisions On) for all specifications. Include Process and Print Options for each section as follows (check boxes under):

- "Sections" Print/Process Sections and Renumber Paragraphs
- "Reports" a Section Table of Contents (Include Without Scope and Combine sections and section tables of contents)
- "Options" Section Dates shown, Units of Measure as English, Revisions shown, Start Page Numbering with "1", Restart for each section, Use orphan control
- "Header/Footer" (jobtitle) and (jobname) as a Header and Section number and Page number as a footer (similar to format shown on this section of the RFP)

(2) Electronic Media Drawings:

Submit drawings electronically in CAD and PDF format as well as on paper. Provide the following drawings on the 'EMedia'

- interior design furniture footprint
- architectural composite and area floor plans, and reflected ceiling plans
- electrical lighting, thermostat, power and communication drawings

(3) Color boards include:

- electronic color boards in each submittal that show colors of all proposed exterior and interior finishes. In addition, provide actual color boards in the quantity indicated in the submittal distribution list; these color boards shall show actual color samples of all proposed exterior and interior finishes. Resubmittal of color board binders is not required if there are no changes from the previous design submittal; provide updated cover and spine for insertion into the previously submitted SID binder. If only minor changes are required, submit updated binder cover and spine, applicable coded samples (tape ready for application) and corrected legends for the color board binders. If major changes to the color board are required, resubmit the color board binders and include color samples of all proposed exterior and interior finishes and an updated legend.
- electronic FF&E in each submittal that shows colors of all proposed finishes and fabrics with actual color samples of all finishes and fabrics in the binders. Resubmittal of FF&E binder is not required if there are no changes from the previous design submittal; provide updated cover and spine for insertion into the previously submitted FF&E binders. If only minor changes are required, submit updated binder cover and spine, corrected FF&E sections, and applicable coded finish and fabric samples (tape ready for application). If major changes to the color board are required, resubmit the FF&E binders, include actual color samples of all proposed finishes and fabrics.

3.5.1.5 100 Percent Corrected Design Distribution

See paragraphs above explaining Submittal Abbreviation Codes and Activity Distribution Addresses.

Activity / Submittal Item	CENWO-PM-M	DAF/RCO	319 CES
Dwg-1/2	0	1	1
EMedia	1	1	1
Specs	0	1	1

100 PERCENT CORRECTED SUBMITTAL NOTES:

(1) Show revisions executed (deletions removed and insertions markings removed) for all specification sections submitted. Include Process and Print Options for each section as follows (check boxes under):

- "Sections" Print/Process Sections and Renumber Paragraphs
- "Reports" a Section Table of Contents (Include Without Scope and Combine sections and section tables of contents)
- "Options" Section Dates shown, Units of Measure as English, Start

Page Numbering with "1", Restart for each section, Use orphan control - Header/Footer" (jobtitle) and (jobname) as a Header and Section number and Page number as a footer (similar to format shown on this section of the RFP)

(2) Submit drawings electronically in CAD and PDF format as well as on paper.

(3) Do not submit color boards if there are no changes from the previous design submittal. If only minor changes are required, submit applicable coded samples (with tape ready for application) and corrected color legend. If major changes to the color board are required, resubmit the color boards with actual color samples of all proposed exterior and interior finishes and revised corrected color legend.

3.5.1.6 Construction Set Distribution

See paragraphs above explaining Submittal Abbreviation Codes and Activity Distribution Addresses.

Activity / Submittal Item	CENWO-PM-M	DAF/RCO	319 CES
Dwg-1/2	0	1	1
EMedia	1	1	1
Specs	0	1	1

CONSTRUCTION SET SUBMITTAL NOTES:

(1) Include all items in the 100 percent Corrected submittal and incorporate any additional comments made to 100 percent corrected design submittal.

(2) Stamp each drawing sheet (P.E.) by the appropriate Designer.

(3) Include all Electronic Media Drawings in CAD and PDF format on the ' **EMedia** ' in addition to all other Electronic Media documents.

(4) E-mail a copy of the ECI per requirements stated in this section.

(5) Include all changes made through accepted 100 Percent Corrected Design.

3.5.1.7 As-Built Submittals

See Section 01 78 39.00 24 AS-BUILT DRAWINGS for requirements.

3.5.2 Review Comments Disposition

For each design review submittal, the Government will furnish comments from Omaha District and other agencies involved in the review process approximately 21 days **after receipt**, unless indicated otherwise. Conduct the review conference for the 60 Percent and 100 Percent Design submittals approximately 30 days after Government receipt of documents. Clearly outline reasons to justify noncompliance with any review comments so that they may be resolved at the design review conference. Furnish annotated comments, including the disposition of all comments in writing within five (5) days of the review conference. Record comments in the Contractor prepared Meeting Minutes described below. Forward the written documentation to the distribution list shown in paragraph: "Distribution

of Design Documents for Conformance Review" above.

The Government will review the 100% Backcheck Review Documents for a period of fourteen (14) days **after receipt of the documents**. After this review, the Government will send a formal letter allowing the commencement of construction or rejecting the submittal.

Resolve any backcheck review comments to the 100 percent Corrected Design Submittals prior to distribution of Construction Set documents. Furnish copies of Annotated backcheck review comments indicating disposition of all comments with the Construction document set.

3.5.3 Review Comments Resolution

For the review of submitted design documents, Government Agencies will forward review comments for discussion and resolution to the Contractor. For each review conference, provide adequate copies of annotated comments to all conference participants. Resolve comments and problems by immediate follow-on action at the end of conferences. Incorporate valid comments. The Omaha District will recommend acceptance to proceed with construction after receipt of final corrected design documents upon incorporation of all backcheck comments. Conduct as many backchecks as the Government deems necessary. The Government intends to utilize the Dr. Checks review system, which is available at:

<https://www.projnet.org/projnet/binKornHome/index.cfm>, for processing review comments and responses. The Government will provide access rights to the Design-Build Contractor after contract award. The Government reserves the right to not accept design document submittals and withhold design payments if comments on any design document submission are of too great of a significance. If final submittal(s) are incomplete or deficient, requiring correction and resubmittal for review, the Government will deduct the cost of rehandling and reviewing from payment at the rate of \$2000.00 (for each design discipline requiring resubmittal) per submittal. "Design Disciplines" in this paragraph consist of Architectural, Structural, Interior Design, Mechanical, Electrical, Civil/Site work, and Fire Protection.

3.5.4 Delays

The Government will not consider delays caused by the Contractor in completion of the 60 percent design, the 100 percent design or the 100 percent corrected design as valid reasons to delay completion of the entire design. The Government may not be held liable for delays caused by re-submittal efforts caused by designs submitted which are rejected by the reviewers.

3.5.5 Reproduction (For Construction):

Upon the Government's completion of the review of the 100% Corrected Design submittal, reproduce copies of the design documents (accepted for the purposes of beginning construction), subject to the incorporation of the Corrected 100% design review comments. Include the stamp or seal and signature of the registered architect or appropriate engineer responsible for the work proposed to meet the RFP requirements on the cover sheet of the drawings. Include the month and year that the drawings were cleared for beginning construction on each drawing. Include the date that the design documents were cleared for beginning construction on the Cover Sheet of the drawings, Cover Sheet of the Specifications, and Cover Sheet of the Design Analysis. Distribute as indicated above. Retain the

originals for recording of as-built conditions. Upon completion of the project, supply the accepted design documents corrected to reflect as-built conditions to the Government. See Section 01 78 39.00 24 AS-BUILT DRAWINGS for as-built drawing requirements.

3.5.6 Government Design Review and Acceptance

3.5.6.1 Design Review Conference and Post-Design Review Conference Minutes:

Hold all design review conferences at Grand Forks AFB, unless directed otherwise. Government personnel will forward review comments for discussion and resolution prior to the design review conference. For each review conference, provide copies of annotated comments to all review conference participants. Resolve comments and problems by immediate follow-on action at the end of the conferences. Incorporate valid comments. Upon satisfactory Government review of the 100 percent corrected design documents, the Omaha District will formally provide Government acceptance necessary to initiate construction. The Government reserves the right to not accept design document submittals and to withhold design payments if comments are of too great of a significance. If final design submittal(s) are incomplete or deficient, requiring correction by the Contractor and resubmittal for review, the Government will deduct the cost of rehandling and reviewing from payment due the Contractor at the rate of \$2000.00 (for each design discipline requiring resubmittal) per submittal. For each review conference, submit to the Contracting Officer within five (5) calendar days, an electronic copy of meeting minutes summarizing major decision points and issues which require resolution. Attach annotated comments to these minutes.

3.5.6.2 100% Corrected Design Documents

Submit complete design documents in the same quantity and to the same offices listed above in paragraph "**100% Corrected Design Distribution**", for each corrected 100 percent design submittal (one or more) until the Government is satisfied that all review comments are addressed and resolved.

3.5.6.3 Accuracy and Completeness of Design

Do not construe reviews by the Government of the design documents to be an endorsement of the accuracy or completeness of the design. Design deficiencies or omissions in the accepted design are the responsibility of the Contractor.

3.5.6.4 Responses to Review Comments

In responding to review comments presented by the Government, state how and where comments were addressed.

3.5.7 DD Form 1354, Transfer and Acceptance of Military Real Property

Prepare draft DD Form 1354 "Transfer and Acceptance of Military Real Property" (copy available at: www.dtic.mil/whs/directives/forms/eforms/dd1354.pdf with the final design documents. Fill out DD Form 1354 in accordance with DD 1354 Instructions, UFC 1-300-08, and Air Force Manual AFMAN 32-1084 Facility Requirements (2016) and Air Force Instruction AFI 32-1024 Standard Facility Requirements. The deliverable consists of an electronic copy of the DD 1354.

Complete the interim DD Form 1354 after substantial completion of construction in preparation of final acceptance. Complete and store the DD Form 1354 in RMS. When the final costs of construction are accrued, furnish the final DD Form 1354 to the accountable Service, including all additional expenses incurred following the placed-in-service date or the date the interim DD Form 1354 was signed.

3.6 REVISIONS TO THE ACCEPTED DESIGN

3.6.1 Minimization of Design Revisions

The accepted design will be used by all parties involved in construction and in administration of the contract. Therefore, keep the design documents up to date and implement an effective system of making and distributing changes. Since changes to the design increase risk of construction errors and deplete available administrative resources, make every effort to minimize revisions to the accepted design. The Government will use the goal of minimizing changes to the accepted design to measure the effectiveness of the Contractor's management. Use effective quality control during design, and experienced and capable designers as means to accomplish this goal.

3.6.2 Supplemental Design Package and Certification

If revisions to the accepted design (Construction Set) become necessary, submit a Supplemental Design Package using Attachment B "Supplemental Design Certification and Transmittal Form" attached at the end of this specification section. Submit this Supplemental Design Package as a "G-DO" construction submittal in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. The Government will consider the revisions a "Variation". Identify the list of deviations from the accepted design on the Supplemental Design Certification and Transmittal Form and on the construction submittal form ENG Form 4025.

The Contractor's Designer and Contractor's Quality Control Representative as well as the Contracting Officer must approve variations as conforming with the RFP before construction of items affected by these revisions can commence. Comply with all the requirements of paragraph "VARIATIONS" of Section 01 33 00 SUBMITTAL PROCEDURES in preparation of the Supplemental Design Package.

Attachment A - DESIGN CERTIFICATION AND TRANSMITTAL LETTER

[Contractor's Letterhead]

[Date:

_____]

[Contract No.

_____]

[Reviewing Component Address]

Subj: DESIGN CERTIFICATION AND TRANSMITTAL LETTER

[Project Title _____]

[Project Location _____]

[Contract No. _____]

Greetings:

Enclosed are the following documents, which I hereby certify are in compliance with the RFP requirements of the subject construction contract and can be used to commence construction subject to Government Conformance Review:

1. Design Drawings
2. Project Specification
3. Design Analysis
 - a. Civil
 - b. Water Supply and Wastewater Collection
 - c. Architectural
 - d. Interior Design
 - e. Structural
 - f. Mechanical
 - g. Fire Protection
 - h. Electrical
 - i. Communications
 - j. Environmental Protection, Compliance and Permits
 - k. Health and Safety
 - l. Sustainable Design
4. Submittals Register
5. All other Design Deliverables
6. Deviations (List of Deviations with Justification Attached)

[Typed Name, Date and Signature of an
Officer of the Contractor's Company]

[Typed Name, date, and Signature of the Contractor Quality Control (CQC)
System Manager along with Stamp of Approval]

[Typed Name, date, and Signature of the Designer of Record (Registered
Professional Engineer) along with PE Stamp of Approval]

Copy to:

[As standard with the Contractor]

Attachment B - SUPPLEMENTAL DESIGN CERTIFICATION AND TRANSMITTAL FORM

[Contractor's Letterhead]

[Date:

_____]

[Contract No.

_____]

[Reviewing Component Address]

Subj: SUPPLEMENTAL DESIGN CERTIFICATION AND TRANSMITTAL FORM

[Project Title _____]

[Project Location _____]

[Contract No. _____]

Greetings:

The supplemental design items listed below and the attached documents, unless identified otherwise, I hereby certify are in compliance with the RFP requirements of the subject construction contract and are compatible with other elements of work, subject to Government conformance review:

1. Nature and Features of the Design Variation(s):
2. Why the each Design Variation is desirable and Beneficial to the Government:
3. List of any additional Deviations from the RFP:
4. List of Specific Documents Supporting Design Variation(s):
 - a. Design Drawings
 - (1) Sketches:
 - (2) Reissued Drawings:
 - (3) Descriptive Changes:
 - b. Project Specification
 - (1) Reissued or New Sections:
 - (2) Descriptive Changes:
 - c. Design Analysis
 - (1) Reissued Pages:
 - (2) Reissued or New Calculations:
 - d. Any other Design Deliverable:

[Typed Name, Date and Signature of an
Officer of the Contractor's Company]

[Typed Name, date, and Signature of the Contractor Quality Control (CQC)
System Manager along with Stamp of Approval]

[Typed Name, date, and Signature of the Designer of Record (Registered
Professional Engineer) along with PE Stamp of Approval]

Copy to:
[As standard with the Contractor]
-- End of Section --

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5/07

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PART 2 NOT USED

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-- End of Section Table of Contents --

SECTION 01 33 00.36

65 PERCENT DESIGN REQUIREMENTS

5/07

PART 1 65 PERCENT DESIGN SUBMITTALS

Attachments: Fire Protection Code Analysis and Handicapped Checklist

For general submittal requirements, See Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES.

1.1 REFERENCES

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-3 (2001) Requirements for the Preparation of Sampling and Analysis Plans

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-101-01 (2020; with Change 1, 2021) Architecture

UFC 3-240-01 (2020; with Change 2, 2021) Wastewater Collection and Treatment

UFC 3-260-01 (2020; Change 1) Airfield and Heliport Planning and Design

UFC 3-260-02 (2001) Pavement Design for Airfields

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE Fundamentals Handbook (2021) Fundamentals Handbook

ASHRAE Hdbk-IP (2022) Fundamentals Handbook, I-P Edition

ASHRAE HA (2020) HVAC Applications Handbook

1.2 CIVIL/SITE

1.2.1 DRAWINGS

1.2.1.1 Location Plan and Vicinity Map

A Vicinity Map consists of a small scale drawing of the project location, similar to a road map. A Location Plan consists of a small scale drawing showing the Government property or reservation limit with the construction project site shown. The drawing shall show the facility approved Contractor Access and Haul Routes. A reproducible base sheet, if available, may be provided by the Omaha District for the Contractor's use in preparing the Location Plan.

1.2.1.2 Survey Plan

The information depicting existing conditions used to generate site

drawings shall be shown on this drawing. An engineering survey of the site will be presented to the Contractor selected as a result of this RFP process. Any additional survey information required by the Contractor for design above that shown in the prepared engineering survey shall be procured and paid for by the Contractor.

1.2.1.3 Removal Plan

The removal plan will show the existing physical features and condition of the site before construction. This information should include the field survey to show all above and below ground utilities; buildings, drives, roads and parking areas, walks, and vegetation; and such facilities as retaining walls, underground storage tanks, foundations, etc. Each physical feature to be removed shall be as indicated on the standard legend sheet, a legend on the removal plan, and properly noted: to be removed, to remain, or to be relocated.

1.2.1.4 Site Plan

The Site Plan shall show all the site layout information necessary to field locate the building, walks, parking lots, and all other appurtenances to be constructed on the project. All site related work to be constructed will be located by dimensions. The Site Plan will identify all site related items such as: curbs, pavements, walks, plazas, seating areas, bollards, trash enclosures, retaining walls, chiller units, electrical transformers locations, etc. in accordance with a standard legend sheet or with additional legends or notes. Site Plans shall be at a scale of 1 Inch = 20 Feet or 1 Inch = 40 Feet. Other drawing scales must be approved by the Omaha District. North arrows shall be oriented the same direction on all plan sheets and by all disciplines. No existing or proposed contours shall be shown on this Plan. The Site Plan, prior to adding the dimensions, should serve as the base sheet to the other Plans, such as: Utilities Plan, Grading and Drainage Plans and Landscape Plan. The Site Plan shall show all existing physical features and utilities within and adjacent to the work site that will remain after the proposed construction has been completed. This plan will also show any free zones, construction limits, and storage areas etc. Whenever the Site Plan occupies more than one sheet of drawings, a Key Plan shall be included. Additional plans showing specific areas of the site in smaller scales can be included if more detail is necessary.

1.2.1.5 Geotechnical Drawings

Provide a soil boring location plan and soil boring log sheets. Soil boring location plan shall include location of all soil borings, test pits, in-situ testing, etc. Provide soil boring logs for all borings, test pits, in-situ testing, etc.

1.2.1.6 Grading and Drainage Plan

A preliminary grading and drainage plan shall be provided at the same scale as the site plan (1 Inch = 20 Feet or 1 Inch = 30 Feet). Other drawing scales must be approved by the Omaha District. Tentative new and existing grading contours shall be indicated at 1-foot contour intervals. Indicate finished floor elevation of the new buildings. Plans shall show layout of the new and existing storm drainage systems. Uniform grades shall be labeled using slope arrows. Provide spot elevations at building corners, parking area corners, changes in grade, etc. Provide location and description of benchmarks and indicate vertical and horizontal datums.

1.2.1.7 Grading Sections

Provide grading sections through the site showing finished and existing grades, pavement sections in detail, slope percentage, ditches, etc.

1.2.1.8 Typical Pavement Sections

Provide typical pavement and road sections and details showing interface between new and existing pavements and new pavements of different sections.

1.2.2 SPECIFICATIONS

Provide a listing by title and number of all Technical Specifications proposed for use in the final civil/site/landscape design including those provided by the Government and mandated for use by the Contractor. The Contractor shall use only UFGS guide specifications and Government provided specifications for this project..

1.2.3 DESIGN ANALYSIS NARRATIVE

Design analysis shall include the following:

1.2.3.1 References

Design references used in preparing the civil/site design.

1.2.3.2 Grading

A narrative of the grading design and criteria used.

1.2.3.3 Pavements

A narrative of the pavement design and criteria used.

1.2.3.4 Drainage

A narrative of the drainage design and criteria used. Include information on the storm drain pipe materials selected and their ability to withstand earth dead loads and live loads that will be imposed.

1.2.3.5 Basis, Specific Goals, Objectives and Priorities For Civil/Site Design

The Design Analysis should give the basis for the civil/site design and should establish specific goals, objectives and priorities for civil/site design of the project. Identify, explain and document use of design criteria and how the design meets goals, objectives and priorities. Identify the preferred site development concept. Document pollution prevention measures and other environmental considerations made during design. The 65 percent Design Analysis must be approved and accepted before Final Design.

1.2.4 DESIGN ANALYSIS CALCULATIONS

1.2.4.1 Storm Drainage System Calculations

Storm Drainage System Calculations shall include the following:

a. Drainage area map showing boundaries of each drainage area and respective drain inlet or culvert.

b. Storm run-off calculations for each drainage area.

c. Preliminary storm drain pipe sizing calculations.

1.2.4.2 Pavement Calculations

Pavement thickness calculations for each pavement.

1.3 GEOTECHNICAL

See Structural Design Requirements.

1.4 ARCHITECTURAL

1.4.1 DRAWINGS

Sixty percent architectural drawing submittal shall be a complete set of architectural drawings without large scale details. All other drawings shall be complete except referencing of the large scale details.

1.4.1.1 Floor Plans

Provide a double line Composite Floor Plan of the entire building, drawn at the largest scale practicable to include the entire building on a single sheet. This building is of a size that will require the floor plans to be divided into multiple areas. See paragraph on Drawing Scales for plan scale requirements. Floor plans shall essentially be complete with the exception of large scale detail referencing. Floor plans shall be scaled double-line drawings showing the functional arrangement, pocheing, location of all openings and plumbing fixtures, all section cuts, wall types, all notes and leaders, all general notes, and all dimensions shall be completed. The plans shall indicate door swings, door numbers and window type; door and window schedules are required. A north arrow shall be shown on each floor plan. Enlarged toilet and stair plans shall also be included. The first composite plan sheet shall include a gross area tabulation comparing the actual square feet with the authorized square feet of the facility. Architect-Engineer suggestions for plan improvement shall be fully shown and justified. The Fire Protection Engineers credentials shall be submitted with the 65% submittal. A life safety and building code plan shall be submitted with the submittal. Include the following:

- Overall, control, and door/ window opening dimensioning.
- Match lines for combining individual portions of floor plans.
- Room names and numbers.
- Structural column or bay indicators.
- Wall and building section cuts.
- Door swings and door numbers.
- Window types.
- Fire Protection Engineers Credentials.
- Life Safety and Building Code Analysis.
- Area in square feet.
- General notes.

Also provide a Key Plan at a uniform location on all Floor Plan sheets which shows the interrelationships between the building portions. This

key plan will be scaled, and oriented in the same manner as the floor plan for all plan type drawings of all disciplines. When dimensioning, use arrowheads, not dots or slashes. Where major structural elements are included as parts of architectural detailing, do not indicate sizes. These elements should all be fully defined as part of the structural design documents. Major elements of mechanical and electrical equipment affecting room size or shape, shall be shown on the architectural plans to a practicable extent and coordinated with other respective disciplines. When applicable, Government-furnished, Contractor-installed, or Government-furnished and Government-installed items shall be shown as a dashed line.

1.4.1.2 Reflected Ceiling Plans

Reflected ceiling plans shall be complete including all electrical lights, mechanical supply & diffusers, notes, complete legends and pocheing of all materials to be used. See paragraph on Drawing Scales for reflected ceiling plan scale requirements. Reflected Ceiling Plans shall be provided for all spaces in the building. Reflected ceiling plans shall show the ceiling tile layout and location of gypsum wallboard and other ceiling types where applicable. All light fixtures, air diffusers, grilles, registers, speakers, sprinkler head layout, smoke and heat detectors - if ceiling mounted, and other ceiling mounted items will also be shown on the reflected ceiling plans. The fixtures and other equipment shall be laid out in a regular pattern symmetrical with the ceiling tile grid, or symmetrical with the room centerlines, columns, windows, or other feature that dominates. All ceiling mounted items shown shall be fully coordinated with all other disciplines. Items, such as sprinkler heads, occupancy sensors, etc., in ceiling panels shall be centered in the ceiling panel.

1.4.1.3 Roof Plan

Composite and larger area roof plans shall be complete including all notes, legends, slope indications, and gutter and downspout locations. All elements located on the roof shall be coordinated with all disciplines. See paragraph on Drawing Scales for roof plan scale requirements.

1.4.1.4 Building Elevations

Provide all building elevations complete showing the appearance and architectural treatment. Elevations shall be dimensioned to show total height, and relation to grade. Critical elevations such as top of finish floor, top of steel, etc. shall be indicated. All notes for materials shall be included. See paragraph on Drawing Scales for Exterior Building Elevation scale requirements.

1.4.1.5 Building Sections

Building cross section and longitudinal sections shall be included to show general interior volumes, construction methods, and height of ceilings and partitions. Identify materials used and necessary dimensions. See paragraph on Drawing Scales for Building Section scale requirements.

1.4.1.6 Wall Sections

Drawings shall include all wall sections and stair section conditions including corridors, showing vertical control elevations and dimensions, with all materials labeled. The sections should normally be cut through

doors, windows, and other critical wall section locations. Wall sections shall not be broken. Additional details shall be included when necessary to illustrate important or unusual features. All horizontal dimensions shall occur on the plans and vertical dimensions on the sections and elevations. See paragraph on Drawing Scales for Wall Section scale requirements.

1.4.1.7 Room Finish Schedules

Room finish schedule shall be complete in accordance with Corps of Engineers (COE) standard format.

1.4.1.8 Door, Window, and Louver Schedules

Door schedule shall be complete in accordance with Corps of Engineers (COE) standard format. Schedule shall include door and frame types, except referencing to door details and hardware sets. Window and louver schedules shall be complete including window and louver types except referencing to details.

1.4.1.9 Fire Ratings

Wall ratings, and fire hazards shall be clearly indicated as required by Fire Protection criteria. Wall fire ratings shall be graphically shown by a continuous symbol or pocheing within the wall on a Fire Protection /Life Safety Plan. When other functions coexist with the fire protection functions, their integration shall be clearly indicated, with an analysis that describes how both functions will be served. Provide a separate, composite type floor plan which makes an accurate presentation of these various features and functions.

1.4.1.10 Drawing Scales

Architectural work shall be drawn at the scales listed below. Other scales may be used only by written authorization through the Project Manager, Omaha District. Units of measurements shown on the drawings shall be done in english units. All disciplines should use the same scale for plan sheets. The following is a comparison guide to establish equivalent scaling of drawings:

	<u>ENGLISH</u>
Composite Plans (Note 1)	Varies
Floor Plans	1/8-Inch = 1'-0"
Reflected Ceiling Plans	1/8-Inch = 1'-0"
Detail Plans (Note 2)	1/2-Inch = 1'-0"
Roof Plans	1/8-Inch = 1'-0"
Exterior Elevations	Same scale as plan
Interior Elevations	1/2-Inch = 1'-0"
Interior Toilet Elevations	1/2-Inch = 1'-0"
Building Cross Sections	1/4-Inch = 1'-0"
Wall Sections	3/4-Inch = 1'-0"
Stair Sections	3/4-Inch = 1'-0"
Details (Note 2)	3-Inches = 1'-0"
Wall Types	3/4-Inch = 1'-0"
Fire Protection Plans (Note 1)	Varies

Notes:

1. Scale of composite plan shall be as required so that the

entire facility is drawn on one sheet without break lines.

2. The goal of this requirement is that the details be large enough to show all fixtures, accessories, equipment, materials, manner of construction, clearances required for proper maintenance, and complete dimensions. Toilet rooms and Equipment rooms are examples of the kind of spaces which shall be drawn as a Detail Plan.

1.4.1.11 Legends

Standard architectural material symbols used on the drawings shall be provided as a separate architectural legend drawing located just in front of the architectural drawings in the set. Additional material symbols should be added to the Legend Sheet as needed for the project.

1.4.1.12 North Arrows

North arrows shall be oriented the same direction on all plan sheets and by all disciplines; including site and civil drawings. Plan north shall be "up" or the left on the drawings. Indicate true north on composite plan drawings. North arrows shall be located approximately at the same location on all sheets.

1.4.1.13 Modular Design

Modular Design practices shall be followed in the design of all masonry buildings or components of buildings. Dimensions shall be figured to whole or half-unit lengths of standard units in order to reduce on-site cutting of masonry.

1.4.1.14 Symbols

The Room and Door Numbering system shall be consistent. The standard symbols for Amendments (a triangular box) or Modifications (a type of circular box, see the chapter on Drafting Criteria) to the contract shall not be used for any other purpose, and care must be taken to avoid using even similar appearing but technically different symbols. Room numbering shall start at the main entrance and proceed clockwise around functional areas.

1.4.1.15 Schedules

Schedules for room finish, doors, windows, louvers, etc., shall be clear and complete. As many columns as necessary should be provided in order to present the essential information. The "Remarks" column should not be used as a substitute for an information column. Normally a single item should be presented on each schedule line. Other scheduling methods as standard with the A-E may be used if approved by written authorization from the Project Architect, Omaha District.

1.4.1.16 Notes

Notes may be placed on drawings to reduce the amount of repetitive drafting, provided that clarity is not lost. General notes should be placed at the right-hand edge of the sheet and, if possible, should be located on the first sheet in the set. Notes that pertain to each drawing however, should be placed on each drawing.

1.4.1.17 Dimensions

Dimensions must be complete, accurate and fully coordinated. Dimensions should be to points easily measurable in the construction, and should be laid out to eliminate refiguring in the field. Dimensions should be tied-in to column lines, etc., to facilitate checking. Plan dimensions for frame construction should be to face of stud for exterior walls, to one face of stud for interior partitions, and to centerline of openings. For masonry construction, dimensions should be to one or both nominal faces of masonry and to jambs of openings.

1.4.1.18 Facility Elevation

The level of finished floor shall be indicated as EL.= 100 000. Elevations for footings, etc., shall be related to this figure. Sea level elevations shall not be shown on the building drawings.

1.4.1.19 Access to Utilities

All utilities within the building, such as piping, ductwork, electrical work, etc., shall be concealed in finished areas. Provide plumbing chases in toilet areas. The clear space above ceilings and the size of chases must be carefully figured to accommodate piping slopes and connections, ductwork crossovers, and similar situations. Access must be provided to valves, cleanouts, etc. Space provided for utilities systems must be adequate but should not be excessive.

1.4.1.20 Sketches

All sketches presented during the design phase shall be reduced to 8-1/2" by 11" and included in this design analysis to document the design options and decisions evaluated during the design process.

1.4.2 SPECIFICATIONS

1.4.2.1 Use of Technical Guide Specifications

Unified Facilities Guide Specifications (UFGS) are prepared by the Corps of Engineers to achieve the maximum uniformity in contract specifications. The UFGS describe the type and quality of material and installation normally acceptable for Corps of Engineers' construction, and often represent specific agreement between the Corps and the applicable industry. The provisions of the technical guide specifications should not be changed without justification. The 65% submittal shall include a draft edited specifications of all the applicable sections. Items added or deleted in these specification sections shall be evident, showing "red lines". Complete descriptions including specific size, gauge, and configuration are included in the UFGS for a wide variety of items. The designer must be familiar with the UFGS requirements in order to provide details fully coordinated with the technical specification descriptions. Terminology used on the drawings shall be the same as used in the UFGS. Where it is desirable to detail a variance with the standard provisions of the UFGS, the specifications must be revised to coordinate with the details. New guide specifications shall be limited to those specialty type items not covered in the regular sections of UFGS.

1.4.3 DESIGN ANALYSIS NARRATIVE

The Design Analysis shall be essentially complete with emphasis on the

following:

1.4.3.1 Basic Criteria Statement

A statement indicating the basic criteria to be applied to the design including type of construction (noncombustible, etc.), category of construction (permanent, etc.), major fire protection and exit requirements, etc.

1.4.3.2 Description of Materials

A description of materials for all major building components and of all interior and exterior finishes ascertaining their matching of existing. The description of materials must include type of exterior wall construction, room finish schedule, window types, panel materials, etc. The description of materials should follow the continuity of the UFC 3-101-01. The description of finishes may be presented in schedule form.

1.4.3.3 Additional Criteria/Clarification

A list of items on which additional criteria, clarification, or guidance is required.

1.4.3.4 Reason for Selection

The written presentation must include the designer's reasons for selecting specific materials, architectural compatibility, and architectural treatment in all cases in which the reason for selection is not obvious.

1.4.3.5 Site Adaptation of Standard Drawings

Site adaptation of standard drawings shall include the following in the design analysis.

a. An outline of the selections made where the standards permit the designer a choice of design or material.

b. An outline of items on the standard that do not conform to current criteria or to the design instructions, and suggested methods for changing the standards.

c. An outline of errors found in the standards and suggested methods for correction.

d. An outline of improvements the designer feels should be made to the standards, with full explanation and justification.

1.4.3.6 General Parameters

The design analysis shall follow the format described herein.

a. The purposes, overall functions, and total capacities of the facility.

b. The design theme or visual appearance of the exterior and interiors of the building, and how this facility coordinates with the image criteria of the installation on which it will be constructed.

c. The number of personnel to use facility

- d. The type of activities and equipment involved
- e. The anticipated life of the functions to be accommodated
- f. The category of construction: permanent

1.4.3.7 Functional and Technical Requirements

- a. Functional areas, occupant capacities, and function
- b. All items of equipment required
- c. Occupational safety and health
- d. Handicapped accessibility
- e. Energy conservation and sustainability goals
- f. Sound and vibration control
- g. Utility areas
- h. Physical security: lock and keying, intrusion-detection, alarms, restricted access areas, interior guard support, and ties to local authorities
- i. Justification for selection of exterior and interior finishes and materials
- j. Moisture and vapor control

1.4.3.8 Design Objectives and Provisions

- a. Building layout to establish convenient circulation flows during normal operation and emergency evacuation activities, for materials, equipment, services, and people.
- b. Type of construction materials, architectural systems, and finishes.
- c. Building flexibility
- d. Physical security
- e. Barrier-free design
- f. Energy conservation
- g. Acoustical design
- h. Moisture and vapor mitigation.
- i. Enhancement of materials and systems maintenance and operation.
- j. Economy of building construction, operation, and maintenance: life-cycle cost effectiveness.

1.4.3.9 Coordination with Installation or Outside Agencies

- a. Physical security support.
- b. Occupational safety and health, as required.
- c. Government furnished equipment.
- d. Operations and maintenance support.

1.4.3.10 Code Analysis

Fire Protection Code Analysis, if not provided on the drawings or needing additional clarification, shall be included in the Design Analysis.

1.4.4 DESIGN ANALYSIS CALCULATIONS

- a. Net room areas, occupant capacity and gross building areas.
- b. U-values for each wall, window, door, or roof type studied or selected.
- c. Acoustics: Analyze existing acoustics and STC ratings of roof, floor/ceiling, and walls of the secured boundary and rooms requiring STC ratings, and provide an analysis of how to achieve required STC ratings. Interior walls, floors, and ceilings shall also be analyzed and documented with an industry tested standard to achieve the desired rating. The Mass Briefing Room and the Heritage Room shall be analyzed by an acoustic engineer for reverberation, sound absorption, etc. for the intended usage (presenter using a microphone) of the rooms for large meetings and statements of recommended finish treatments, i.e. acoustic wall panels, ceiling treatments, etc.
- d. Rainfall intensity relative to roof area and roof gutter and downspout size and number calculations.

1.5 INTERIORS

1.5.1 DESIGN ANALYSIS NARRATIVE

The design analysis shall contain an explanation of the desired image or visual appearance of the interior of the facility and the design intent.

1.5.2 DRAWINGS

A furniture footprint indicating proposed furniture layout shall be incorporated into the drawings. Drawings shall be at 1/4" = 1'-0" scale. Identify on drawings if furniture is not in contract.

1.5.3 SPECIFICATIONS

Appropriate UFGS guide specifications shall be provided and coordinated with the drawings and design analysis. Specifications shall be edited to identify proposed product and installation requirements. Where materials or installation requirements are not covered in the provided specifications, information shall be prepared to cover these items.

1.5.4 COLOR BOARDS AND LEGENDS

Color boards shall show actual color samples of all proposed exterior and interior finishes. A color board legend shall accompany the boards and

shall clearly identify all finishes. Clarification of finish placement shall be required when more than one color of a single finish is proposed. Include prewired workstation finishes and fabric samples. Color boards shall be 8 1/2" x 11" in size and provided in a three ring binder. Include project name and location, design stage and date on the front cover and spine of the binder.

1.6 STRUCTURAL

1.6.1 DRAWINGS

Drawings shall include roof and floor framing plans, floor slab plans and foundation plans. Roof and floor framing plans shall show sufficient details to clearly indicate the type of framing system used, size and spacing of members and their elevations. The location of all columns or pilasters shall be shown, and all building structural members shall be at least outlined. The sizes, locations and elevations of footings shall be shown. Slab plans shall be coordinated with the Architectural sheets and shall indicate the locations of structural walls and masonry partitions, recessed slabs and contraction or construction joints. Concrete slab-on-grade thicknesses and sections shall be shown. Proposed treatment of special footings and unique or complex features and details shall be shown on the drawings. Elevation views, sections and details necessary to illustrate the design at a 65% level of completion shall be provided. Drawings shall also include overall building plan dimensions, north arrows, and design notes. Drawings shall be at done at a scale appropriate for the design, in no case however, shall plan type drawings be done at a scale smaller than 1/8" = 1'-0" or detail type drawings at a scale smaller than 1/2" = 1'-0".

1.6.2 SPECIFICATIONS

For this 65% design submittal the Contractor shall provide a listing by title and number of all Technical Specifications proposed for use in the final structural design. Identify special sections that are to be developed.

1.6.3 DESIGN ANALYSIS NARRATIVE

Design analysis shall follow the format described in Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES, Paragraph 3.3, "Design Analyses" and the specific content shall be essentially as outlined below.

1.6.3.1 Design Criteria and References

A list of design criteria references, such as DOD Unified Facilities Criteria, Department of the Army Technical Manuals, ACI Standards, AISC Specifications, etc., and any other references which were used in the design of the project shall be included in the narrative.

1.6.3.2 Design Loads and Conditions

A list of structural design loads and conditions shall be provided, including:

- Snow load parameters;
- Wind load parameters

- Seismic design parameters;
- Roof live loads;
- Floor live loads, identifying each loading with usage and the room or space where used;
- Foundation design criteria, including the design depth for footings, allowable soil bearing pressure, equivalent fluid densities (or lateral earth pressure coefficients) for the design of earth retaining structures and building components, modulus of subgrade reaction, and any other pertinent data derived from the recommendations of the Final Geotechnical Investigation Report Foundation Analysis, a copy of which shall be included as an Appendix to the design analysis.

1.6.3.3 Structural Materials

A list of structural materials shall be provided, together with the stress grades and/or ASTM designations, as applicable, for structural steel, concrete, and reinforcing steel; the series for steel joists; and identification of the proposed use of each material in the structure.

1.6.3.4 Description of the Structural System

A concise description of the proposed structural system for the building, together with the reasons for its selection, shall be provided. All principal elements of the structural system selected shall be described. Typically, these shall include:

- Primary supporting members for the roof;
- Masonry walls, type of material, and whether load bearing or non-load bearing, with location of load-bearing walls defined, and measures taken to compensate for expansion/contraction and crack control in masonry walls;
- The proposed system for resisting lateral forces (wind and earthquake) and transferring them to the ground, whether diaphragms, chord bracing, shear walls, braced or moment resisting frame, etc;
- Foundations, description of special designs to accommodate existing site conditions;
- Concrete slab-on-grade floors, description of floor surface finish treatment, accommodation of live loads, and the use, location and types of crack control joints;
- The proposed treatment of any unusual structural loadings, features or unique solutions to structural problems.
- Identification of any major vibrating elements and measures taken to isolate them.

1.6.4 Design Analysis Calculations

The extent of the structural calculations shall be indicative of a design which has reached a 65% level of completion. Computations shall include snow, wind, seismic, dead and live loads. Computations shall show sizing and spacing of structural members for roof and floor framing, sidewalls and foundation sizes, as appropriate to the systems to be used for these elements.

1.6.5 Final Design Analysis

The preliminary geotechnical investigation data included in this RFP are

intended for proposal preparation and preliminary design use. The Contractor will be responsible for verification of the actual soil conditions present at each site location prior to commencing final design.

The Contractor's geotechnical engineer shall accomplish additional site investigation, soil borings, and laboratory testing as deemed necessary to support the design of the project. A final geotechnical investigation report shall be prepared and submitted to the Contracting Officer.

The work will be coordinated with the Contracting Officer and shall not interfere with normal base operations. The cost of any additional geotechnical work shall be included in the contract amount.

1.7 MECHANICAL

Compliance with the design requirements for the building mechanical systems will be determined by a review of the submitted 65 percent drawings, design analysis, and specifications. Any conflicts in the design requirements or lack of thorough understanding of the nature and scope of work shall be identified and resolved prior to submittal of the 65 percent design.

1.7.1 DESIGN DRAWINGS

The 65 percent design drawings shall be fully coordinated with the design analysis. Sufficient plans, piping diagrams, sections, flow diagrams, details, schedules, and control diagrams/sequences shall be provided as necessary to define the required design intent. Floor plans shall use the architectural floor plans as a basis, with the building outline half-toned. Unless otherwise indicated, all floor plans shall be drawn at 1/8" = 1'-0" scale and show all room names and numbers. An exception to this are administrative areas being air-conditioned shall be 1/4" = 1'-0" scale and mechanical room plans shall be 1/2" = 1'-0" scale. Sheet reference number sequencing shall be in accordance with the National CADD Standards with Omaha District CADD requirements. Submittal drawings shall include, but not limited to, the following:

1.7.1.1 Mechanical Index Sheet

An index sheet identifying all mechanical drawings shall be provided, including those drawings anticipated to be provided in the 100 percent design submittal. Index shall include drawing design file numbers, drawing numbers, sheet numbers, and drawing descriptions.

1.7.1.2 Mechanical Abbreviation, Legend, and General Notes Sheet

This sheet shall include all mechanical abbreviations and symbols that will be used on the drawings. Symbols shall be grouped into sections; as a minimum, provide sections for Plumbing, Heating, Miscellaneous Piping, Valves and Fittings, and ventilation.

1.7.1.3 Exterior Utility Drawings

The following exterior utility drawings shall be provided:

a. Removal Plan

All existing exterior mechanical utilities and utilities which are to be removed shall be indicated on the Site Removal Plan located in the civil

section of the drawing package.

b. Utility Plan:

All existing and new mechanical utilities shall be indicated on the Site Composite Utilities Plan located in the civil section of the drawing package. The location of existing exterior utilities shall be thoroughly checked and indicated on plans and profiles, thus preventing interference with new services. The utility drawing shall indicate all new utilities, including tie-in points, and existing utilities which are to be abandoned.

1.7.1.4 Plumbing Drawings

The following plumbing drawings shall be provided:

a. Plumbing Plans

Plumbing plans showing the design and tentative layout of the domestic hot and cold water distribution systems; make-up water piping; soil, waste and vent piping; and storm water drainage system shall be provided. Plans shall show all anticipated routing of piping systems from the connections within the structure to a point 5 feet outside the structure. The grade of all drain lines shall be calculated and invert elevations established. All electrical panels/equipment and pertinent HVAC equipment (expansion tanks, boilers, AHU's, pumps, lawn sprinkler system, etc.) shall be outlined in half-tone on the plumbing plans. Plans may combine building areas and be drawn at $1/8" = 1'-0"$ scale as long as legibility is not compromised. Plumbing fixtures and drains shown on the drawings shall be designated by the same identification system used in the Technical Specification and Plumbing Fixture Schedule.

b. Enlarged Mechanical Room Plumbing Plan

An enlarged mechanical room plumbing plan drawn at a minimum $1/4" = 1'-0"$ scale shall be provided. Plan shall show layout of all plumbing equipment and piping within the rooms. In addition to all the plumbing systems required, the plan shall show half-toned outlines of all HVAC equipment located in the room, gas service, lawn sprinkler apparatus, the fire protection entrance and risers, and the outline of any electrical panels or equipment located in the room.

c. Plumbing Detail and Schedule Sheet

The following details shall be provided: water heaters, and water service entrance. The provided plumbing fixture schedule and a contractor generated water heater schedule shall be provided.

1.7.1.5 Mechanical HVAC Drawings

Show on mechanical HVAC drawings, all items of mechanical equipment, including boiler room equipment, HVAC equipment layout, air handling units, air distribution and exhaust systems, etc., to determine proper space allocation within the intent of the architectural layout requirements. Plans, elevations, and sections shall be developed sufficiently to insure that major equipment items, piping, and ductwork cause no interference with structural members, electrical equipment, etc. The following HVAC drawings shall be provided:

a. Mechanical HVAC Plans

Mechanical HVAC plans showing the design and tentative layout of the hot water piping distribution system and equipment, the air supply and distribution systems, and the ventilation and exhaust systems shall be provided. Air supply and distribution systems shall show all ductwork, including supply and return ductwork, ductwork to diffusers, and all diffusers. For the 65 percent submittal, all ductwork may be shown as single-lined. The final design submittal shall show all ductwork as double-lined. All electrical panels/equipment and pertinent plumbing equipment shall be outlined in half-tone on the HVAC plans.

b. Enlarged Mechanical Room HVAC Plans

Enlarged mechanical room HVAC plans showing all mechanical systems and drawn at a minimum $1/2" = 1'-0"$ scale shall be provided. Plans shall show layout of all equipment, piping, and ducts located within the rooms. Equipment shall include (but not limited to) air handling units with associated outside air intakes, relief air, and supply/return ducts; exhaust/supply fans, mechanical room ventilation intake/relief openings, gas service entrance, combustion air opening, unit heaters, HW pumps, boilers, expansion tanks, and temperature control panels. Plans shall show dedicated access space for items requiring maintenance. In addition to all the mechanical HVAC systems required, the plan shall show half-toned outlines of all major plumbing equipment, the water service entrance, fire protection entrance and riser, lawn sprinkler apparatus, and any electrical equipment or panels located in the room.

c. Mechanical Room Sections:

For each air handling unit within the mechanical room, a mechanical room section view shall be provided showing, but not limited to, all AHU components, ductwork connections/routing, and relationship to adjacent structural features.

d. Chilled Water System Flow Diagram:

Provide flow diagram showing the facility piping system including the pumps and connected chilled water equipment. Each pump and equipment item shall show associated cfm flowrate. All thermometers, pressure gauges, isolation and control valves, bypass piping, freeze protection piping, etc. shall be shown on the flow diagram.

e. Mechanical Detail Sheets:

Installation details showing all specification requirements such as isolation and balancing valves, thermometers, pressure gauges, equipment pads, strainers, vents, hangers, vibration isolation, etc. shall be provided for each item of mechanical equipment. As a minimum, the following mechanical details shall be provided to the extent they are included in the design:

- Refrigerant Piping Diagram
- Hot Water Boiler and Piping Diagram
- Chilled water piping Diagram
- Chilled water pumps
- Hot Water Pumps
- Expansion Tanks
- Horizontal Unit Heater
- Vertical Unit Heater

- Chemical Shot Feeders
- Gas Service Entrance
- Radiant Floor Heating Piping Diagram
- Radiant Floor Manifolds
- Cabinet Unit Heater
- Air Handling Units
- Wall Propeller Supply/Exhaust Fan
- In-line Supply/Exhaust Fan
- Relief Hood
- Relief Vent
- Exhaust Hoods
- Seismic Requirements for Floor-Mounted and Suspended Equipment
- Infra-red System

f. Mechanical Schedule Sheets

Schedules, with preliminary capacities, shall be provided for each item of mechanical equipment. Furnished typical equipment schedules shall be used whenever possible and shall be revised and completed as necessary to suit the project requirements. In addition to the furnished schedules, damper and control valve schedules shall also be provided.

1.7.1.6 HVAC Control Drawings

Simplified, one-line type control schematics showing all control system interface points and detailed sequence of operation shall be provided for all mechanical equipment and systems. Sequence of operation for each item of equipment and system shall be sub-sectioned into paragraphs describing discreet operational requirements. The following drawings shall be provided:

HVAC Controls Legend:

This sheet shall include all control abbreviations and symbols that will be used on the drawings. Furnished Controls Legend sheet shall be used as a basis for all abbreviations and symbols used on the Final Control Drawings.

a. Misc Systems

These sheets shall include all miscellaneous equipment items such as supply/exhaust fans, unit heaters, radiant floor, infra-red heaters, controls air compressor, etc. that are not interlocked to the main HW or air handling unit systems. Provide control schematic and sequence of control for each item of equipment on the same sheet.

b. Hot Water System

Provide a boiler and pumping system control schematic and sequence of operation.

c. Radiant Floor Water System

Provide a manifold and zone pumping system control schematic and sequence of operation.

d. Air Conditioning System:

Provide a condensing unit, evaporator and chilled water pumping system control schematic and sequence of operation.

e. Air Handling Systems

For each air handling system, including outside air makeup system, provide a control schematic and a sequence of operation. Include all items of equipment that are interlocked to each system.

f. Control Points Lists

Provide Local Control Panel control points lists for all items of equipment and systems, identifying all anticipated temperature control system input/output points. The format for defining the input/output points shall be as identified on the furnished Example Control Point List sheets.

1.7.2 TECHNICAL SPECIFICATIONS

None of the government provided guide specifications are required to be submitted at the 65 percent design stage. However; any Contractor generated specifications required to meet the project specifics, or individual specification items added to the provided guide specifications shall be submitted for review.

The following UFGS guide specifications shall be edited and coordinated with the drawings and design analysis to identify the proposed product and installation requirements for the facility:

33 61 00	Prefabricated Underground Heating/Cooling Distribution System
33 51 03	Gas Distribution System
13 48 00	Seismic Protection for Miscellaneous Equipment
13 48 00	Seismic Protection for Mechanical Equipment
23 07 00	Thermal Insulation for Mechanical Systems
23 20 00	Chilled, Chilled-Hot, and Condenser Water Piping System
23 23 00	Refrigerant Piping
33 51 01	Gas Piping Systems
22 00 00	Plumbing, General Purpose
23 54 16	Heating System: Gas-fired Heating
23 52 00	Water and Steam Heating; Oil, Gas or Both; up to 20 MBTUH
42 22 00	Liquid Chillers
23 82 02	Unitary Heating and Cooling Equipment
23 00 00	Air-Supply, Distribution, Ventilation, and Exhaust System
23 09 23	Direct Digital Control for HVAC and Other Local Building Systems
23 05 93	Testing, Adjusting and Balancing of HVAC Systems
23 08 00	Commissioning of HVAC Systems

Proposed HVAC and Temperature Control System Performance Test and Functional Performance Checklists shall be included in the appropriate specifications.

1.7.3 DESIGN ANALYSIS NARRATIVE

The narrative portion of the design analysis shall contain a narrative description and analysis for each of the mechanical portions of the design. The basis and reasons for specific engineering decisions, special features, unusual requirements, etc., shall be explained or summarized as applicable. If it is necessary to deviate from criteria or standard

practice, reasons shall also be included. Design statements shall be provided in sufficient detail to enable the reviewer to get a clear picture and understanding of all included work so that approval will be granted. Narrative shall be complete relative to scope and intended design approaches. The total scope projected to final design shall be outlined in a form that will be conveniently adapted, expanded, and detailed at the final design stage. If alternatives were to be evaluated and selected by the designer, findings (pros and cons) and conclusions shall be included. The design analysis shall carry a complete narrative for every item and system covered in the design, and shall include, but not be limited to, the following:

1.7.3.1 Index

Provide a design analysis index identifying all main and sub-paragraph headings.

1.7.3.2 Project Summary

Provide a brief description of the mechanical design objectives.

1.7.3.3 Applicable Criteria

A list of all applicable criteria used for basis of design.

1.7.3.4 Technical Specifications

A list of Technical Guide Specifications that will be used for the project.

1.7.3.5 Design Conditions

A list of Mechanical HVAC design conditions including elevation, latitude, heating/cooling degree days, winter and summer outside design temperatures, inside design temperatures for all spaces, ventilation rates, etc. shall be provided.

1.7.3.6 System Descriptions

Provide a complete description of all building systems; include the designer's reasons for selecting specific materials, systems, etc. in which the reason for selection is not obvious. System descriptions shall be include, but not limited to, the following:

- Plumbing System
- Exterior Gas Distribution System
- Interior Gas Piping System
- Hot Water Heating System
- Radiant Floor System
- Exhaust Hoods
- Air Supply and Distribution Systems
- Ventilation and Exhaust Systems
- Temperature Control System
- Seismic Protection
- Chilled Water System
- Refrigeration System
- Infra-red system

1.7.4 DESIGN ANALYSIS CALCULATIONS

The Design Analysis calculations shall provide an estimate of the heating, cooling, and ventilation loads to determine a preliminary selection of the type and size of mechanical equipment to be used. Design calculations shall be provided in sufficient detail to enable the reviewer to get a clear understanding of all work to allow approval. Backup data shall be furnished to support basic design decisions related to sizing of major equipment and materials, performance of specific systems or equipment. Manufacturer's catalog data sheets shall be provided for each item of equipment selected. Calculations may be performed by manual or computerized procedures. Use of standardized charts, curves, tables, graphs will generally be acceptable for portions of required calculations lieu of specific calculation procedures. Such data must be from a recognized source which is identified in the design analysis and shall be included with the calculations. Design calculations and computations shall be provided for all systems and shall include, but not limited to, the following:

1.7.4.1 Index

Provide a design analysis index identifying all calculation items.

1.7.4.2 Design Conditions

A list of Mechanical HVAC design conditions including elevation, latitude, heating/cooling degree days, winter and summer outside design temperatures, inside design temperatures for all spaces, ventilation rates, etc. shall be provided.

1.7.4.3 Zone Air-Conditioning Loads

Preliminary cooling calculations shall be prepared using the Cooling Load Temperature Differential/Cooling Load Factors (CLTD/CLF) Method as described in the ASHRAE Fundamentals Handbook.

1.7.4.4 Block Air-Conditioning Loads

Preliminary block cooling load calculations, encompassing the air-conditioned areas, shall be prepared using the CLTD/DLF Method.

1.7.4.5 Chilled Water Pump Selections

Include pump flow calculations and catalog selection data indicating dimensions, connection sizes, rpm, horsepower, and efficiency.

1.7.4.6 Heating Loads

For each area or room requiring heat; provide calculations.

1.7.4.7 Heating Load Summary

A tabular summary of all heating load calculations for each area or room, including combustion air heating, shall be provided.

1.7.4.8 Boiler Selection

Include boiler capacity adjustments for altitude, inefficiency, and net rating. Provide catalog data indicating input capacity, net output

capacity, dimensions, and water and flue size connections.

1.7.4.9 Hot Water Pump Selection

Include pump flow calculations and catalog selection data indicating dimensions, connection sizes, rpm, horsepower, and efficiency.

1.7.4.10 Combustion-Air Requirements

Include combustion air quantity and free area calculations, louver selection, combustion air heating requirements, and selection of heating equipment.

1.7.4.11 Unit Heater Selections

For each area requiring a unit heater, provide data on capacity, weight, and horsepower.

1.7.4.12 Mechanical Ventilation

For each area or room requiring mechanical ventilation for cooling; provide calculations similar to zone air-conditioning, louver selection, and catalog fan data.

1.7.4.13 Toilets/Janitor Room Ventilation

Provide calculations, catalog fan data, and louver selections, for each toilet area.

1.7.4.14 Air Handling Units

A tabular summary of all airflow calculations for each area or room shall be provided on each air distribution system for fan sizing.

1.7.4.15 Domestic Water Demand

Calculations for determining the size of the domestic cold water supply line to the building shall be provided.

1.7.4.16 Domestic Hot Water Demand

The design guidance provided for service water heating in ASHRAE HA shall be followed to determine the domestic hot water demand for the facility. Provide catalog data for the domestic water heaters.

1.7.4.17 Electrical Load Summary

A summary of all mechanical equipment and the associated electrical load requirements shall be provided.

1.7.5 ENERGY CONSERVATION

Mechanical designs shall be economical, maintainable and energy conservative with full consideration given to the functional requirements and planned life of the facility. Emphasis shall be given to heat reclamation, outside air usage and other energy conservation measures for mechanical systems. Each major item of proposed mechanical equipment shall have a net efficiency rating that is equal to or exceeds the net efficiency ratings of similar or equal equipment of the four manufacturers

each having one of the four highest ratings.

1.7.6 AIR POLLUTION CONTROL

Air pollution control shall be incorporated in all designs. The Architect-Engineer shall investigate the latest Using Service, Local, State, and Federal regulations and standards, analyze and report on requirements in the design analysis, and include in the design as applicable. The most stringent of all regulations and standards shall be implemented into the design. If in doubt as to requirements, contact this office for assistance.

1.8 ELECTRICAL

1.8.1 DRAWINGS

Drawing scale shall match architectural drawing requirements. Drawings shall show the following:

1.8.1.1 Lighting Layout and List of Fixtures

Complete lighting layout of all areas shall be provided. The type of fixture shall be indicated on the drawing. Complete list of fixtures proposed with type of lamp and wattage.

1.8.1.2 Receptacle Layout

Complete receptacle layout should be provided for all areas to indicate project requirements.

1.8.1.3 Power Equipment and Layout

Power equipment and layout such as switchboard, panelboards, large motor driven items, etc.

1.8.1.4 Power One Line Diagram

Power one line diagram shall be shown to indicate arrangement of the system.

1.8.1.5 Fire Detection

Fire Detection drawings shall be provided and inserted in the Fire Protection/Fire Suppression F-Series of drawings.

1.8.1.6 Miscellaneous Details of Special Equipment

Miscellaneous details of special equipment to indicate understanding of 01 86 26 ELECTRICAL REQUIREMENTS.

1.8.2 SPECIFICATIONS

Submit prescriptive specification sections to specify the quality, characteristics, installation procedures and testing requirements for all items of the proposed electrical design.

Specifications shall be provided (to approximately 65 percent completion). See Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES, paragraph 3.2, SPECIFICATIONS for additional

requirements.

1.8.3 DESIGN ANALYSIS NARRATIVE

The design analysis shall contain a description and analysis of the electrical portions of the design. Special features, unusual requirements, etc., should be noted. Narrative must address all technical requirements identified in Section 01 86 26 ELECTRICAL REQUIREMENTS.

1.8.4 DESIGN ANALYSIS CALCULATIONS

Backup data shall be furnished to support basic design decisions related to sizing of major equipment and materials. As a minimum the following shall be submitted.

1.8.4.1 Service

Sizing of building services EMD (Estimated Maximum Demand) for all the building loads.

1.8.4.2 Transformers

Sizing of general purpose dry type transformers and building service transformer.

1.8.4.3 Feeders

Sizing of main feeders.

1.8.4.4 Panelboards

Sizing of panelboards and distribution equipment.

1.8.4.5 Illumination Calculations

Data should identify target and calculated illumination levels for all typical rooms. Calculations should be adjusted to compensate for special applications such as irregularly shaped rooms, open sides, ceiling obstructions (beams, ductwork), corridors, etc. If the lumen method is used for corridor calculations, the calculations should be performed using a module in which the length doesn't exceed 3 times the width (2:1 ratio preferred).

1.8.4.6 Short Circuit Evaluation

The maximum possible fault current at the building service should be calculated.

1.8.4.7 Generator

Sizing of generator and associated equipment including but not limited to automatic transfer switch and fuel tank.

1.8.4.8 Uninterruptible Power Systems (UPS)

Sizing of UPS systems and associated equipment including but not limited to batteries, and battery racks.

1.9 CYBERSECURITY

1.9.1 DESIGN ANALYSIS

The design analysis shall contain a description and analysis of the electrical portions of the design. Special features, unusual requirements, etc., should be noted. Narrative must address all technical requirements identified in Section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS

1.9.2 SPECIFICATIONS

Submit prescriptive specification sections to specify the applicable cybersecurity controls implementation for each frcs based upon coordinated project reviews and coordination with across all disciplines which includes Commissioning Agent(s).

Specifications shall be provided (to approximately 65 percent completion). See Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES, paragraph 3.2, SPECIFICATIONS for additional requirements.

1.9.3 DRAWINGS

Identify Mission Space(s) as applicable on plan sheets.

1.10 COMMUNICATIONS

1.10.1 Drawings

Drawing scale shall match architectural drawing requirements. Drawings shall be organized and demonstrate that the work complies with all requirements of the RFP as follows:

1.10.1.1 Outside Plant Distribution

Maintenance hole and ductbank system layout shall show all exterior features including: quantity and sizes of ducts, maintenance hole types, cable types and routing.

1.10.1.2 Voice and Data Plans

Complete layout of all areas and outlets shall be provided. The type of outlets shall be indicated. Cable tray, conduits and other pathways shall be shown, with sizes indicated. Racks, cabinets, and other equipment shall be shown and identified.

1.10.1.3 Riser Diagrams

Provide riser diagrams that indicate the ER, TR's risers, backbone trays and conduits, typical horizontal cabling, backbone termination areas, and service entrance configurations, and all backbone cabling (including types and counts).

1.10.1.4 Outlet Configurations

Show all unique outlet configurations, including connector types and quantities and labeling conventions.

1.10.1.5 Rack, Cabinet , and Equipment Elevations

Show typical elevations of each type of rack, cabinet, or other equipment or termination enclosures, including cable management, grounding, power, patch panels, connectors, etc.

1.10.1.6 Plans

Show all devices and equipment for Public Address, and CATV.

1.10.1.7 Riser Diagrams

Provide a separate riser diagram for each system, showing all major components, typical minor components (speakers, volume control, etc.) and interconnecting cabling.

1.10.2 Specifications

Submit prescriptive specification sections to specify the quality, characteristics, installation procedures and testing requirements for all items of the proposed communications design.

1.10.3 Design Analysis Narrative

The design analysis shall contain a description and analysis of the communications portions of the design. Special features, unusual requirements should be noted. Narrative must address all technical requirements identified in section 01 86 29 COMMUNICATIONS REQUIREMENTS.

1.10.4 Design Analysis Calculations

Backup data shall be furnished to support basic design decisions related to sizing of cable trays and conduits.

1.11 FIRE PROTECTION

1.11.1 DRAWINGS

Features of Fire Protection, their ratings, and the hazards requiring them, shall be clearly indicated. Sprinkler and fire alarm/detection areas shall also be clearly indicated. Fire detection mass notification and sprinkler systems shall be laid out and detailed sufficiently to indicate the designers understanding of the Section 01 86 13 FIRE PROTECTION REQUIREMENTS. When other functions co-exist with the fire protection functions, their integration shall be clearly indicated, with an analysis that describes how both functions will be served. Provide a separate, composite type floor plan which makes an accurate presentation of these various features and functions. As part of the submittal, provide a set of plans that shows emergency egress for the facility. Provide the Fire Protection Engineer of Record's credentials with this submittal. Fire Protection Engineer shall conduct a fire hydrant flow test in accordance with NFPA 291 and submit it with the 65% package.

1.11.2 SPECIFICATIONS

None of the Unified Facilities Guide Specifications (UFGS) are required to be submitted at this design stage. However; any Contractor generated specifications required to meet the project specifics, or individual specification items added to the provided guide specifications shall be

submitted for review. Note that UFGS sections 21 13 13.00 10, and 21 13 18.00 10 are required for this contract. UFGS sections may be edited only for those portions that do not apply to this project. For the items that do apply, no changes may be made.

1.11.3 DESIGN ANALYSIS

The design analysis shall include a separate fire protection report containing, but not limited to, review statements calculations, and/or comments on the following items, where applicable.

- a. Location and rating of fire walls and fire partitions.
- b. Column, floor, and roof protection.
- c. Path of travel for emergency egress and operation of panic exits.
- d. Access to building for fire fighting.
- e. Design and placement of fire and smoke stop doors.
- f. Labeled windows, where required.
- g. Venting of smoke.
- h. Placement of hand fire extinguisher cabinets.
- i. Type and layout of sprinkler system, and hydrant flow test data.
- j. Building exterior fire protection facilities and building clearances.
- k. Type of occupancy.
- l. Zoning of fixed fire protection systems.
- m. Type and adequacy of fire alarm and detection systems.
- n. Zoning of fire alarm and detection systems.
- o. Fire Protection Engineer of Record's credentials.
- p. Locations and designs of any clean agent suppression systems.
- q. Life Safety and Building Code Plans.
- r. Number of zones of alarm and detection systems that are separately transmitted to the base or installation fire department.

1.12 ENVIRONMENTAL PROTECTION COMPLIANCE

1.12.1 SPECIFICATIONS

If Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION is not adequate for compliance with environmental laws and regulation for this project, the Contractor shall be responsible for developing additional requirements and/or editing the specification to ensure that the project is in full environmental compliance. If Section 01 57 20.00 10 ENVIRONMENTAL

PROTECTION is revised by the Contractor, the revised specification shall be included with this submittal.

1.12.2 DESIGN ANALYSIS NARRATIVE

The Contractor shall prepare a chapter in the Design Analysis entitled: "Environmental Protection Compliance". This chapter shall summarize how the project complies with environmental laws and regulations with regard to environmental permits, notices, reviews and/or approvals by the governing authorities. As a minimum, the chapter shall include the following:

- a. The list of Permitting and/or Approving Authority(ies).
- b. The list Construction/Operating Permits, Notices, Reviews and/or Approvals required for the project. If, when checking with the environmental agencies, a permit, notice, or approval is not required, include a copy of the telephone conversation memorandum or letter from the agency stating nothing required.
- c. Time required by the permitting agency(ies) to process the application(s) and issue the permits.
- d. Fee schedule including filing/application fees, review fees, emissions fees, certification testing, etc.
- e. Monitoring and/or compliance testing requirements.
- f. Copies of the completed application forms and associated documents.

1.12.3 Submittal of Environmental Approvals, Permits Applications and Associated Documents

Approvals and/or Permits, for which the facility is required to be permittee or the facility is required to submit for approval to the Federal, State, or local governing agency, may be required to be submitted with 65 percent design documents because of time restraints for obtaining the permit. The Contractor shall complete the technical portions of the approvals, permit applications and complete the required associated supporting material. This package shall be submitted to the Corps of Engineers with sufficient time for the Federal Facility to receive the approval and/or permit prior to construction commencing.

1.13 SUSTAINABLE DESIGN

See Sections 01 33 29 SUSTAINABILITY REPORTING and 01 81 00 SUMMARY OF WORK for additional requirements. The summary documentation shall be part of the design analysis and the Air Force Sustainability Requirements Scoresheet shall be included in the Design Analysis.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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SECTION 01 33 00.38

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05/07

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SECTION 01 33 00.38

100 PERCENT DESIGN REQUIREMENTS

05/07

PART 1 100 PERCENT DESIGN SUBMITTALS

For general submittal requirements, see Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES.

1.1 REFERENCES

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360 (2016) Specification for Structural Steel Buildings

AMERICAN CONCRETE INSTITUTE (ACI)

ACI SP-66 (2004) ACI Detailing Manual

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 241 (1990; REAF 1997) Electric Power Systems In Commercial Buildings

IEEE 242 (2001; Errata 2003) Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems - Buff Book

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020; Errata 1 2021) Structural Welding Code - Steel

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-3 (2001) Requirements for the Preparation of Sampling and Analysis Plans

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019, with Change 1, 2022) Structural Engineering

UFC 3-240-01 (2020; with Change 2, 2021) Wastewater Collection and Treatment

UFC 3-260-02

(2001) Pavement Design for Airfields

1.2 CIVIL/SITE

1.2.1 DRAWINGS

1.2.1.1 Location Plan and Vicinity Map

A Vicinity Map consists of a small scale drawing of the project location, similar to a road map. A Location Plan consists of a small scale drawing showing the Government property or reservation limit with the construction project site shown. The drawing shall show the facility approved Contractor Access and Haul Routes. A reproducible base sheet, if available, may be provided by the Omaha District for the Contractor's use in preparing the Location Plan.

1.2.1.2 Survey Plan

The information depicting existing conditions used to generate site drawings shall be shown on this drawing. An engineering survey of the site will be presented to the Contractor selected as a result of this RFP process. Any additional survey information required by the Contractor for design above that shown in the prepared engineering survey shall be procured and paid for by the Contractor. Include a list of all control points and benchmarks in table format.

1.2.1.3 Final Construction Phasing Plan & Operational Safety Plan

A final comprehensive construction phasing plan and operational safety plan shall be developed and included.

1.2.1.4 Removal Plan

The removal plan will show the existing physical features and condition of the site before construction. This information should include the field survey to show all above and below ground utilities; buildings, drives, roads and parking areas, walks, and vegetation; and such facilities as retaining walls, underground storage tanks, foundations, etc.. Each physical feature to be removed shall be as indicated on the standard legend sheet, a legend on the removal plan, and properly noted: to be removed, to remain, or to be relocated.

1.2.1.5 Site Plan

The Site Plan shall show all the site layout information necessary to field locate the building, walks, parking lots, and all other appurtenances to be constructed on the project. All site related work to be constructed will be located by dimensions. The Site Plan will identify all site related items such as: curbs, pavements, walks, plazas, bollards, trash enclosures, retaining walls, etc. in accordance with a standard legend sheet or with additional legends or notes. Site Plans shall be at a scale of 1 Inch = 20 Feet or 1 Inch = 40 Feet. Other drawing scales must be approved by the Omaha District. North arrows shall be oriented the same direction on all plan sheets and by all disciplines. No existing or proposed contours shall be shown on this Plan. The Site Plan, prior to adding the dimensions, should serve as the base sheet to the other Plans, such as: Utilities Plan, Grading and Drainage Plans and

Landscape Plan. The Site Plan shall show all existing physical features and utilities within and adjacent to the work site that will remain after the proposed construction has been completed. This plan will also show any free zones, construction limits, and storage areas. Whenever the Site Plan occupies more than one sheet of drawings, a Key Plan shall be included. Additional plans, showing specific areas of the site in smaller scales can be included if more detail is necessary.

1.2.1.6 Grading and Drainage Plan

A final grading and drainage plan shall be provided at the same scale as the site plan 1 Inch = 20 Feet or 1 Inch = 30 Feet. Other drawing scales must be approved by the Omaha District. In addition to the requirements for the preliminary plan, the final plan shall show the final location of all storm drains, culverts, and subdrains. Storm drainage lines and structures shall be labeled. The rim elevation of all manholes, curb inlets, and area inlets shall be indicated.

1.2.1.7 Composite Utilities Plan

A Composite Utilities Plan shall be provided at a scale of 1 Inch = 20 Feet or 1 Inch = 30 Feet. Other drawing scales must be approved by the Omaha District. New and existing utilities shall be indicated. Plans shall show layout of the new and existing storm drainage systems, gas systems, sanitary systems, electrical systems, communication systems, water systems, steam systems and any other utilities which need to be provided for. Include new and existing contours.

1.2.1.8 Pavement Details

Provide details of concrete curb and gutter, integral curb, typical pavement sections, typical sidewalk section, pavement utility cut details, and interface detail between new and existing pavement. Concrete curb and gutter and integral curb shall conform to standard details provided, in RFP drawings.

1.2.1.9 SWPPP Site Map

Provide a site map indicating drainage patterns and approximate slopes anticipated after major grading activities, areas of soil disturbance, areas which will not be disturbed, locations of major structural and nonstructural erosion controls identified in the Storm Water Pollution Prevention Plan, locations where stabilization practices are expected to occur, locations of off-site material, waste, borrow or equipment storage areas, surface waters (including wetlands), and locations where storm water discharges to a surface water.

1.2.1.10 Erosion Control Details

Provide details of best management practices used to control erosion.

1.2.1.11 Landscape Plan

A Landscape Plan showing trees, shrubs, ground covers, seeded and sodded areas, shall be prepared. The Landscape Plan shall be prepared by a fully qualified, experienced professional Landscape Architect. The A-E (Contractor's Designer) shall specify types of plant materials that are locally grown, commercially available and acclimated to the project environment. The Landscape Plan shall include a plant materials schedule

or listing. This schedule shall include botanical names, common names, size, and remarks. The Landscape Plan shall also show all unsurfaced ground areas disturbed by construction within the project limits with these areas shown to be seeded, sodded, or mulched as required.

1.2.1.12 Landscape Details

The Contractor shall verify the methods of planting to meet the project site/installation requirements and provide the necessary Landscape Details to perform the contract design work. Details shall reflect local practices and conditions for installation. The Contractor shall provide designs and details as necessary for other required site furnishings and accessories.

1.2.2 SPECIFICATIONS

Provide complete edited specifications for all items. Technical specifications shall be complete and fully coordinated with the drawings. All specification indexes shall be completely edited to reflect the paragraphs retained in the body of the specification. All references that have not been used in the body of the specification shall be edited from the technical specification.

1.2.3 DESIGN ANALYSIS NARRATIVE

Design analysis shall include the following:

1.2.3.1 References

Provide design references used in preparing the civil/site design.

1.2.3.2 Basis For Design

The Design Analysis should give the basis, specific goals, objectives and priorities for civil/site design of the project. Identify, explain and document use of design criteria and how the design meets goals, objectives and priorities. Identify the preferred site development concept. Document stormwater pollution prevention measures and other environmental considerations made during design.

1.2.3.3 Grading

A narrative of the grading design and criteria used.

1.2.4 Design Analysis Calculations

1.2.4.1 Pavement Calculations

Pavement thickness calculations for each pavement.

1.3 GEOTECHNICAL

See Structural Design Requirements.

1.4 WATER SUPPLY AND WASTEWATER

1.4.1 DRAWINGS

Generally, the corrected and approved 65 percent plans may be used as the basis for the final plans. However, all details necessary for complete construction must be included. The 100 percent final design submittal shall include all the information presented in the 65 percent submittal, updated to final design status, corrected to reflect any changes made in response to review comments, and shall include the additional requirements specified hereinafter. Any concerns in developing the final design documents shall be resolved prior to starting the final design stage.

1.4.1.1 Water Distribution and Sewage Collection Systems Plans (including building services)

Provide all existing utilities and above ground features, including sizes and material types, which may pose as an obstacle (i.e., water, sewer, gas, electrical, etc.) on the basic site plan layout. Indicate existing pipe material and sizes where new lines connect along with the type of connection and elevations of connections. Provide all new water and sewer lines with sizes. This will include all new service lines, up to within the 5-foot building line. Locations of all new manholes, fire hydrants, valves (including PIV's), similar appurtenances, connection points and etc. shall be provided. For pavement cuts, show type of pavement to be removed and replaced. Show contours on plan view. Include stationing on both plan and profile sheets.

1.4.1.2 Water Distribution and Sewage Collection Systems Profiles

Profiles of all gravity sewers, waterlines (excluding service connections) and sewage forcemains shall be provided. Profiles may be omitted for short waterlines, unless necessary to assure adequate cover or avoid interference with other underground facilities. Indicate existing pipe material and sizes where new lines connect. Indicate type of connection and elevation. Include all interference elevations.

1.4.1.3 Water Distribution and Sewage Collection Systems Details

Appropriate water and sewer details shall be provided. Use Omaha District standard detail drawings. The standard detail sheets will be furnished if required. For roadway pavement crossings, indicate installation method (open cut, boring, jacking, etc.). Include standard casing details.

1.4.2 SPECIFICATIONS

Specifications shall be coordinated with the plans and include all items. Provide special sections to cover those subjects for which no UFGS guide specifications are used or available. These special sections shall include all approved changes from the 65 percent review stage. All UFGS guide specifications, to be provided, shall be in edited form showing all text to be deleted and added.

1.4.3 DESIGN ANALYSIS NARRATIVE

Design analysis shall include the following and all applicable data contained in the 65 percent design analysis narrative shall be repeated. References shall not be made to the previous design analysis. The final design analysis shall be corrected to reflect changes in content made in

response to review comments, and shall be expanded to reflect the completed design.

1.4.3.1 References

Provide design references used in preparing the water and wastewater design.

1.4.3.2 Water Supply and Distribution Systems

A narrative of the water supply and distribution systems design and applicable criteria used shall be provided. Include the peak and average domestic demands, the interior and exterior fire flow requirements and the available flow and residual pressures. A description of the water distribution system, and complete calculations necessary to support equipment, piping sizes, interior and exterior fire demands, and domestic demands, etc. shall be provided.

1.4.3.3 Wastewater and Sewers

A narrative of the wastewater supply design and applicable criteria used shall be provided. Include the average, diurnal peak, and extreme peak flows along with the full flow capacity (70% of the total depth) of the system. The design shall be in accordance with velocity requirements of UFC 3-240-01. A listing of allowable piping materials, and complete calculations necessary to support equipment and piping sizes shall be provided.

1.5 ARCHITECTURAL

1.5.1 DRAWINGS

The drawings shall be complete, include all necessary and required details, thoroughly checked, and fully coordinated with the technical specifications and all other Construction Documents. Previous comments and applicable criteria changes shall have been incorporated into the design. Removal work and details should be shown on separate drawings. The contract drawings shall fully describe the type and the scope of work required. The layout of individual sheets and the organization of the assembled set shall follow and communicate a logical sequence. General information shall be presented first, progressing to more detailed information. When assembling details, begin in the upper left-hand corner of the sheet with letters progressing to the right and down. When dimensioning, use arrowheads, not dots or slashes. See 65% Architectural drawing submittal requirements for drawing scales of remaining drawings to be submitted. Include all drawings from the 65% submittal plus all additional detail drawings required for complete 100% design.

Final Life Safety and Building Code drawings shall be submitted and stamped by the Fire Protection Engineer of Record (FPE). Also, a letter certifying the project shall be submitted by the FPE per UFC 3-600-01.

Drawings shall include but not be limited to the following:

- Interior Elevations and Details
- Door Details
- Window Details
- Louver Details
- Roof Details

Stair Details
 Casework Plans, Elevations, and Details
 Wall Plan Details and Plan Details
 Fire Wall Details and Penetration Conditions
 Sealant Details
 Stamped and sealed Life Safety and Building Code Plans
 FPE Letter of Certification
 Tile and/or Flooring Details
 Ceiling Details
 Control/Expansion Joint Details
 All Miscellaneous Details

1.5.2 SPECIFICATIONS

The technical specifications shall be complete and fully coordinated with the drawings. Special sections shall be prepared to cover those subjects for which no guide specification is available. Notes to the Designer that accompany specifications shall be used in editing technical guide specifications. All specification indexes shall be completely edited to reflect the paragraphs retained in the body of the specification. All UFGS guide specifications shall be edited in accordance with Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES.

1.5.3 DESIGN ANALYSIS NARRATIVE

The Design Analysis shall include the basic information presented in the previous submittal, corrected to reflect changes in content made in response to review comments. Outline specifications shall be omitted from the Final Design Analysis as the information is included on the final drawings and project specifications. The design analysis shall be written in the present tense.

1.5.4 DESIGN ANALYSIS CALCULATIONS

The Design Analysis calculations shall include the basic information presented in the previous submittal, corrected to reflect changes in content made in response to review comments.

1.5.5 COMMON DEFICIENCIES

Some repeated errors have occurred in the preparation of design documents in the past. Subsequently these errors have been identified and the Contractor directed to make corrections. The work involved in such corrections becomes lost effort and time for the designer. Some of these errors which are most often overlooked include:

- a. Not using correct abbreviations or terminology on the drawings. Abbreviations must match what is used on the standard abbreviation sheet and terminology must match what is used in the standard technical guide specifications.
- b. Not using the correct scales, north arrow designation, section cut system, or incomplete dimensioning on the drawings.
- c. Not providing sufficient space for door operation hardware at doors which swing into a wall running perpendicular to the opening. 100 mm minimum is required between edge of door frame and perpendicular walls.

- d. Not providing correct and complete Design Analysis information written in the present tense. The Design Analysis will be written following the format indicated herein. A separate Fire Protection section in the Design Analysis with input from all disciplines is one area which is often overlooked and shall be included.
- e. Not providing a structural stoop at new exterior doors and ramps where the slab is at the same approximate elevation as the interior floor. The use of simple slabs on exterior grade leads to lifting of the slab in below-freezing temperatures which interferes with the safe operation of the door.
- f. Not correctly presenting or coordinating (to avoid interference) features of Fire Protection, Noise Control, and Physical Security.
- g. Not correctly referencing and cross referencing building sections, wall sections, details, etc.
- h. Failure to read/use technical notes in editing the Technical Guide Specifications.
- i. Failure to coordinate all disciplines prior to submittal of projects for review.
- j. Improper use of fire-retardant wood. Fire-retardant wood is combustible; its use in buildings that are of noncombustible construction is extremely limited (see IBC for the minor allowable uses). Because of the potential for severe degradation, fire retardant plywood shall not be used in a roof or roofing system, or in structural applications.
- k. Incorrectly listing trade names in door hardware specifications in lieu of ANSI numbers and failure to correctly specify hardware finishes.
- l. Control and expansion joints in walls, floors, roofs, and ceilings are not shown on architectural plans, elevations, and structural plans, or are not consistently shown through all building elements. Note also control joint locating and coordination for floor tile per Tile Council of America recommendations.
- m. Failure to delete all publications which do not apply to the particular project.
- n. North is not oriented the same direction on all sheets (civil, site, arch).

1.6 INTERIORS

1.6.1 DESIGN ANALYSIS NARRATIVE

Updates as a result of the 65% review conference shall be made to the design analysis.

1.6.2 DRAWINGS

Updates required to the furniture footprint as a result of 65% review shall be incorporated into the drawings.

1.6.3 SPECIFICATIONS

Technical specifications shall be in final form for construction (in accordance with the requirements of Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES and shall include all changes requested during the 65% review stage. All specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product, installation requirements, and testing methods for this facility.

1.6.4 COLOR BOARDS AND LEGENDS

Color boards shall show actual color samples of all proposed exterior and interior finishes. A color board legend shall accompany the boards and shall clearly identify all finishes. Clarification of finish placement shall be required when more than one color of a single finish is proposed. Color boards shall be 8 1/2" x 11" in size and be provided in a three ring binder. Include project name and location, design stage and date on the front cover and spine of the binder.

1.7 STRUCTURAL

1.7.1 DRAWINGS

Final drawings shall be complete, thoroughly checked, and fully coordinated with the other disciplines, specifications and all other construction documents. Previous comments and applicable criteria changes shall have been incorporated into the design. The drawings shall be complete with all plan views, elevations, sections, details, schedules, diagrams, and notes necessary for the construction of the project. For structural steel framing, the drawings shall meet the requirements for design drawings set forth in AISC 360. All structural steel members and connections shall be fully detailed. Design of structural steel connections shall be the responsibility of the structural design engineer and shall not be delegated to the steel fabricator. For structural concrete, the drawings shall conform to the standards for engineering (design) drawings set forth in the ACI Detailing Manual ACI SP-66. Additionally, those items described below which are applicable to the design shall be incorporated into the drawings. Drawings shall be at a scale appropriate for the design, in no case however, shall plan type drawings be done at a scale smaller than 1/8" = 1'-0" or detail type drawings at scale smaller than 1/2" = 1'-0".

1.7.1.1 Grid Systems, Dimensions, and Floor Elevations

Each foundation and slab plan, floor framing plan and roof framing plan shall have an alpha-numeric grid system aligned with centerlines of any columns or pilasters, or with load bearing and non-load bearing walls, as applicable. The same grid system shall be used for all plan views. Each plan view shown shall have all necessary dimensions. On plan views, the dimensions shall define the location of grid lines, offsets, and all structural elements, as well as the overall sizes of the buildings and structure. The finish elevation of the floor shall be indicated as 100'-0", and elevations for all other roofs, floors, and foundations shall be numerically referenced to this basic elevation.

1.7.1.2 Plan Sheets

a. Foundation and Slab Plans

Foundation and slab plans shall show the size and location of all foundation elements, such as foundation walls, grade beams, piers, footings, piles, and pile caps, drilled piers, and foundation drains. Elevations for footings, pile caps, and foundation drains shall be indicated on the plan. Plans for building slabs-on-grade and exterior stoop slabs at building entrances shall show location and type of joints, slab thicknesses and reinforcing, elevation of slab surfaces, and any other design features, such as drain trenches or equipment bases, which affect the slab design. Also, indicate if slabs are placed over a vapor barrier and capillary water barrier.

b. Framing Plans

Separate framing plans shall be provided for each structural floor roof and all parts of the structure. Plans shall show the size, spacing, and location of all roof and floor framing members, their supporting columns, pilasters or walls, all auxiliary members such as bracing and bridging, sag rods and the size and location of all major openings through floors and the roof.

1.7.1.3 Elevation Views, Sections and Details Sheets

Elevation views, sections and details necessary to illustrate fully the design shall be provided. Some requirements peculiar to the various structural materials are described below.

a. Concrete

Drawings shall include elevation views as necessary, plus sections and details to show the outlines of concrete cross-sections, reinforcing bar arrangements, concrete cover for rebar, installation of embedded items, and joint construction. All lap splice and embedment lengths for reinforcing bars shall be clearly indicated on the drawings. A sill detail for each foundation condition at exterior and interior doors shall be provided.

b. Masonry

Wall reinforcing shall be located and identified on plans, in section cuts, elevation views or in schedules. Structural elevations when needed shall be included to clarify the construction requirements for masonry reinforcement, especially the reinforcement around wall openings. Details applicable to the project shall be shown on the structural drawings. Listed below are some frequently required masonry details, most of which are shown in UFC 3-301-01, and on the Typical Masonry Sheets. The Typical Masonry Sheets will be provided to the successful offeror upon request and may be edited and incorporated into the final drawings as needed. Additional details as required shall be extracted from other sources and incorporated into the final drawings. All details shall be fully edited to reflect the specific requirements of this project. Supplemental details shall be added as necessary to complete the design.

Masonry Details Frequently Used

- Masonry Control Joint (MCJ).
- Brick Expansion Joint (BEJ) (
- Control Joint at Bond Beam.
- Bond Beam Corner Reinforcement.

- Seismic Reinforcement Around Wall Openings.
- Wall Reinforcement Details for 1 and/or 2 bar-per-cell stiffeners.
- Doweled or Other Connection of Masonry to Foundation, Floor, Roof or Bond Beam.
- Bond Beam (or Steel) Lintels and Bearing Details
- Lateral Support Detail for Top of Masonry Partition Walls.
(lateral support locations must be shown on framing plan sheets.)
- Steel Joist Bearing

c. Structural Steel, Steel Joists, and Steel Decking

Structural steel connections shall be fully detailed and shown on the drawings. The anchorage of beams, trusses, joists, and steel deck to walls or other bearings, and the extra framing or reinforcement required at deck openings shall also be detailed. Notes, details, or schedules on the drawings shall indicate the steel deck attachment method to be used, and shall give the size and spacing for perimeter, side lap, intermediate supports and end lap attachments. Welded connections shall be detailed using standard weld symbols illustrated in AWS D1.1/D1.1M. All applicable weld sizes, spacing, types, contours and finishes shall be shown.

1.7.1.4 Schedules

a. Foundation Schedules

Foundation schedules for the foundation type selected shall be included, as applicable. The schedule shall include all pertinent information required for the foundation system being used.

b. Framing Schedules

For concrete framing, beam and column schedules shall conform to the requirements of the ACI SP-66. For structural steel framing, provide a column schedule complete with design loads at splices, if any, and at column bases.

1.7.1.5 Equipment Loads

All equipment loads which exceed 200 lbs and are not supported by concrete slab-on-grade shall be identified on the drawings by showing equipment locations, total weights, and reaction loads at support points.

1.7.1.6 Notes

a. Design Notes

Under the heading "Designer's Notes," the structural drawings shall contain notes which begin: "The structural design was prepared using the following data:". The data then listed shall include the structural loading criteria used for design, such as roof and floor live loads, snow load design parameters, wind speed and wind load design parameters, seismic design parameters vehicular loads, allowable soil bearing pressures (as recommended by the Final Foundation Analysis report, foundation design depth, design wind uplift pressures for steel joists and other data pertinent to future alterations. Also, to be listed are the ASTM designations and stress grades of the applicable structural materials: structural steel, masonry, cold-formed metal framing, concrete for each usage, reinforcing bars, welds, and bolts.

b. General Notes

Other notes, which direct the work to be performed, the materials to be used, etc., shall be grouped under the heading of "General Notes." Included in these notes should be a description of the building's structural system, if necessary.

1.7.2 SPECIFICATIONS

Technical specifications for final design shall be prepared in accordance with the instructions provided in Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES, Paragraph 3.2 "Specifications". The technical specifications shall be complete and fully coordinated with the drawings. All specification indexes shall be completely edited to reflect the paragraphs retained in the body of the specification. All references that have not been used in the body of the specification shall be edited from the technical specification.

1.7.3 DESIGN ANALYSIS NARRATIVE

The final design analysis narrative shall repeat and expand upon the basic information presented in the 65% design analysis narrative, and shall be corrected to reflect revisions made for the final design.

1.7.4 DESIGN ANALYSIS CALCULATIONS

Calculations shall be prepared by an experienced structural engineer and shall include an investigation of loading, (gravity, wind, seismic, etc.) shear, moment, wind uplift, stability and deflection calculations. The computations are to be systematic and accurate. Similar beams, columns, panels, or connections may be grouped by designing the largest member or connection in the group, but every individual slab, beam, column, footing, connection or other structural member or structural consideration indicated by the plans shall be accounted for by pertinent calculations, statement or reasoning, or reference to a design source. Design formulas shall be written out in symbols the first time each is used, before the numerical values are supplied. All formulas and results(answers) shall be identified by dimensional units. Basic assumptions of loads, working stresses, and methods of analysis must appear in the calculations; these assumptions must be applied consistently to a given problem. Complete design calculations shall be required for all original designs. The calculations shall be presented in a clear and legible form, incorporating a title page, table of contents, and a tabulation showing all design loads and conditions. Pages shall be numbered consecutively and identified in the table of contents. Cross referencing shall be clear. The source of loading conditions, formulas, and references will be identified. Assumptions and conclusions shall be explained. Superseded areas of computations must be ruled out. All computations shall be given a complete numerical and theoretical check within the Contractor's office. Calculation sheets shall carry the names or initials of the developer and the checker, and the dates of calculations and checking. No portion of the design calculations shall be developed and checked by the same individual.

1.7.4.1 Computer Calculation Submittals

All applicable input and output data shall be included in readable printed form as part of the design calculations. Continuous paper such as that used in computer terminals or printers shall be cut into individual

pages and shall not be submitted in a continuous roll form. All input and output data shall include a brief synopsis of the computer program(s) stating required input, method of solution, approximations used, codes and specifications used, output generated, extent of previous usage or certification of the program(s), and program author(s). Generalized flow chart(s) may be used to supplement description of solution process, if desired. All computer generated and long-hand calculation sheets shall be identified by sheet number, indexing and cross-referencing. Each member or structure being analyzed shall be identified, dimensioned and shown in a loading diagram. A separate diagram shall be provided for each load case, such as dead plus live, dead plus wind, etc. Input and output values including intermediate values shall clearly be identified if such values are necessary for evaluation of the submittal.

1.7.5 Final Geotechnical Investigation Report

The preliminary geotechnical investigation data included in this RFP are intended for proposal preparation and preliminary design use. The Contractor will be responsible for verification of the actual soil conditions present at each site location prior to commencing final design.

The Contractor's geotechnical engineer shall accomplish additional site investigation, soil borings, and laboratory testing as deemed necessary to support the design of the project. A final geotechnical investigation report shall be prepared and submitted to the Contracting Officer.

The work will be coordinated with the Contracting Officer and shall not interfere with normal base operations. The cost of any additional geotechnical work shall be included in the contract amount.

1.8 MECHANICAL

The 100 percent final design submittal shall include all the information presented in the 65 percent submittal, updated to final design status, corrected to reflect any changes made in response to review comments, and shall include the additional requirements specified hereinafter. Any concerns in developing the final design documents shall be resolved prior to starting the final design stage.

1.8.1 DRAWINGS

The final design drawings shall be fully coordinated with the design analysis and specifications. Provide sufficient plans, piping diagrams and isometrics, mechanical room sections, water and air flow diagrams, details, schedules, control diagrams, sequences of operation, etc., as necessary to define the design requirements. Large-scale plans of congested areas shall be provided. Coordinate with architectural design for provision of access panels for all concealed valves, traps and air vents, etc. Floor plans shall use the architectural floor plans as a basis, with the building outline half-toned. The final design drawings shall include all the requirements and drawings defined for the 65 percent submittal. In addition, the following new drawing requirements and drawings shall be provided:

1.8.1.1 Mechanical Abbreviation, Legend, and General Notes Sheet

On this sheet, include any mechanical general installation notes that may be required to clarify the construction intent that may not be readily apparent in the specifications or on the drawings. General notes may be

provided on a separate sheet if space does not exist on the Abbreviation and Legend sheet.

1.8.1.2 Plumbing Drawings

Enlarged Toilet Room Plans:

Enlarged toilet room plans showing all fixtures, water, waste, and vent piping shall be provided for each toilet area. Enlarged plans shall be drawn at a minimum $1/4" = 1'-0"$ scale.

1.8.1.3 Mechanical HVAC Drawings

Hot Water System Flow Diagram:

Provide a hot water flow diagram showing the boiler, pumps, and all connected heating equipment including radiant floor heating system. Each equipment item shall show associated flowrate. All thermometers, pressure gauges, isolation and control valves, bypass piping, etc. shall be shown on the flow diagram.

Chilled Water System Flow Diagram:

Provide a chilled water flow diagram showing the cooler, pumps, and all connected cooling equipment. Each equipment item shall show associated flowrate. All thermometers, pressure gauges, isolation and control valves, bypass piping, etc. shall be shown on the flow diagram.

1.8.1.4 HVAC Control Drawings

In addition to the updated Controls Legend and System Block Diagram Sheets, final HVAC control drawings for each system and item of equipment shall be in accordance with the following requirements:

Control Diagrams:

Control Diagrams shall be provided for each system or item of equipment. Systems diagrams shall include every major component installed in or connected to the system, and only one system shall be shown on each diagram. Control Diagrams shall schematically show all sensors, controllers, actuators, indicators, and operator interface devices that are required for the complete automatic control and monitoring of the system. All sensing devices utilized in the control or instrumentation of the system, and all actuating devices shall be shown in their correct mechanical location and functionally interconnected to the other control devices which comprise the control loop. All controlling devices shall be shown with all functional interconnections to inputs and outputs. Each sensing, controlling, actuating, and indicating device shall have its own unique control loop tag identifier. Communication linkages required to complete the entire intended interface between operators and the control system shall be shown schematically. This includes interconnections between local temperature control panels and the base EMCS. All associated thermometers and pressure gauges, located in their correct mechanical locations, shall also be shown on the diagrams. See furnished Example HVAC Control Drawings for the required level of detail and formatting.

Sequence of Operations:

Sequence of Operations shall be provided for each item of equipment or system and shall fully describe the intended operation of the equipment or system in all different operating modes. As identified on the furnished Example Control Drawings, each Sequence shall be broken down by individual control loops and shall include descriptions of both normal operating modes (running, shutdown, standby, etc.) and abnormal, emergency or safety related modes. Sequences shall include a description of all indication instrumentation, alarm conditions, and automatic actions to be taken upon occurrence of alarm conditions. Each device referenced in the sequence shall be referred to by its unique tag identifier, with each component designator shown in parenthesis. Design setpoints shall be specified for each control loop and indicated as being adjustable. See furnished Example HVAC Control Drawings for the required level of detail and formatting.

The designer shall analyze every component of each system and write each Sequence of Operation to compliment the Functional Performance Checklists. The Sequence of Control on the project drawings shall be explicit and written to ensure that all the requirements of the "Functional Performance Test Checklists" can be accomplished.

Control Points Lists:

Control points lists, identifying each temperature control system input and output, shall be developed for each temperature control panel. See furnished Example HVAC Control Drawings for the required level of detail and formatting.

1.8.2 SPECIFICATIONS

The submitted 65 percent technical guide specifications shall be updated, completely edited, and fully coordinated with the drawings to accurately and clearly identify the final product and installation requirements for the facility.

1.8.3 DESIGN ANALYSIS NARRATIVE

The Final Design Analysis Narrative shall include the information presented in the 65 percent submittal, shall be corrected to reflect changes in content made in response to review comments, and shall be expanded to reflect the completed design.

1.8.4 DESIGN ANALYSIS CALCULATIONS

The Final Design Analysis calculations shall include all the information presented in the 65 percent submittal, shall be corrected to reflect changes in content made in response to review comments, and shall be expanded to reflect the completed design. In addition, the following new calculations shall be provided:

- a. Pipe sizing calculations for the chilled & heating hot water, plumbing, gas piping systems.
- b. Chilled & heating hot water pump head calculations.
- c. Chilled & heating hot water expansion tank sizing.
- d. External static pressure calculations for all fans.

e. Control Valve CV calculations.

1.9 ELECTRICAL

1.9.1 DRAWINGS

Drawing scale shall match architectural drawing requirements.

1.9.1.1 Interior Drawings

Drawings shall be complete and accurate in every detail and shall include arrangements and types of light fixtures, receptacles, switching, location of special features, necessary details, including legends, fixture schedule, panel schedules, one-line diagrams, layout or functional diagrams for each of the various systems, riser diagrams if applicable, estimated maximum demand for each panel and for entire building and any other relative information which will help clear up any and all questionable items on the plans or in the specifications toward the development of a set of plans which will be clear, concise and correct. Additional drawing requirements for specific equipment or systems have been included in subsequent paragraphs pertaining to the equipment or systems.

1.9.1.2 Floor Plans

All rooms must be identified by name and number. Plans must be legible. Plans shall be developed using the same scale and areas as the architectural floor plans. Separate floor plans must be provided for lighting, power, and fire detection.

1.9.1.3 Diagrams

The power one-line diagram shall be on a dedicated sheet. The diagram should show ratings of major equipment including short circuit ratings. Power, communications diagrams, fire detection and telephone diagrams should be on separate sheets also.

1.9.1.4 Schedules

Provide panelboard and lighting fixture schedules. Panelboard schedules shall include the designation, location, mounting (flush or surface), number of phases and wires, voltage, ampacity and total connected and demand load. Indicate the trip rating, frame size, interrupting rating and number of poles for each circuit breaker in the panelboards. List the circuit number, circuit description and load for each branch circuit.

1.9.1.5 Exterior Drawings

Drawings shall be complete and accurate in all details and shall include the routing of all feeder and branch circuits.

1.9.2 SPECIFICATIONS

All specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product, installation requirements, and testing methods for this facility.

1.9.3 DESIGN ANALYSIS NARRATIVE

The text of the preliminary design analysis should be expanded to reflect the completed design. Calculations used to develop the design should be included. The document in its final form should conform in all applicable respects to the requirements of Section 01 86 26 ELECTRICAL DESIGN REQUIREMENTS.

1.9.4 DESIGN ANALYSIS CALCULATIONS

Backup data shall be furnished to support basic design decisions related to sizing of major equipment and materials, selection of economic alternatives, performance of specific systems or equipment. Calculations may be performed by manual or computerized procedures. Use of standardized charts, curves, tables, graphs will generally be acceptable for portions of required calculations or in lieu of specific calculation procedures. Such data must be from a recognized source which is identified in the design analysis. If possible, a copy of applicable sheets or pages should be included with the calculations. For given equipment, the calculations must conform to requirements identified under subsequent paragraphs herein pertaining to the equipment.

1.9.4.1 Service

Sizing of building service.

1.9.4.2 Transformers

Sizing of all transformers and the building service transformer. (Generally for dry type transformers, 1 or 2 samples of detailed calculations to identify the method are sufficient, if input data for remaining units can be derived from panel or feeder sizing data.)

1.9.4.3 Feeders

Sizing of feeders (One detailed sample calculation is sufficient to establish the procedure, remaining data can be in schedules, tables, etc.).

1.9.4.4 Panelboards

Sizing and loading of panelboards and distribution equipment.

1.9.4.5 Voltage drop determination

Provide voltage drop calculations in accordance with IEEE Std 241 to demonstrate that the voltage drop requirements of NFPA 70 are satisfied.

1.9.4.6 Illumination calculations

Data should identify target and calculated illumination levels for all rooms and areas. Calculations should be adjusted to compensate for special applications -- irregularly shaped rooms, open sides, ceiling obstructions (beams, ductwork), corridors, etc. If the lumen method is used for corridor calculations, the calculations should be performed using a module in which the length doesn't exceed 3 times the width (2:1 ratio preferred).

1.9.4.7 Short Circuit Evaluation

Calculate the fault current in accordance with IEEE 242 for each node in the electrical distribution system.

1.9.4.8 Protective Coordination Analysis

A protective coordination study shall be performed to show that the power system is selectively coordinated and is fully coordinated with the upstream breakers. In addition the study shall include all existing and new devices in the Base power plant affected by the installation of the Space Test and Evaluation Facility. The protective coordination / short circuit study shall be complete and approved by the government before any changes are made to the existing equipment or any new equipment is purchased.

1.9.4.9 Specialized Applications

Additional engineering backup should be included to address special requirements such as accommodation of nonlinear loads, harmonics analysis, energy studies, etc.

1.10 CYBERSECURITY

1.10.1 DESIGN ANALYSIS

The design analysis shall contain a description and analysis of the electrical portions of the design. Special features, unusual requirements, etc., should be noted. Narrative must address all technical requirements identified in Section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS.

1.10.2 SPECIFICATIONS

Submit prescriptive specification sections to specify the applicable cybersecurity controls implementation for each frcs based upon coordinated project reviews and coordination with across all disciplines which includes Commissioning Agent(s).

Specifications shall be provided (to approximately 65 percent completion). See Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES, paragraph 3.2, SPECIFICATIONS for additional requirements.

1.10.3 DRAWINGS

Identify Mission Space(s) as applicable on plan sheets.

1.11 COMMUNICATIONS

1.11.1 Drawings

Drawing scale shall match architectural drawing requirements. Drawings shall be complete and accurate in every detail; be coordinated with all other work, sufficiently cross referenced to other drawings and specifications; include appropriate notes, schedules, diagrams and details; shall be organized and demonstrate that the work complies with all requirements of the RFP as follows:

1.11.1.1 Outside Plant Distribution

Drawings shall include maintenance and ductbank system layout shall show all exterior features including: quantity and sizes of ducts, maintenance types, cable types and routing, detail cross references and other notes.

1.11.1.2 Voice and Data Plans

Complete layout of all areas and outlets shall be provided. The type of outlets shall be indicated. Indicate areas served by TR's and equipment rooms. Cable tray, conduits and other pathways shall be shown, with sizes indicated. Racks, cabinets, and other equipment shall be shown and identified.

1.11.1.3 Riser Diagrams

Provide riser diagrams that indicate the ER and TR's; risers, backbone trays and conduits; backbone termination areas; racks and cabinets; service entrance configurations, typical horizontal cabling; and all backbone cabling (including types and counts). Provide separate diagrams for each system. Identify interfaces to other systems (fire alarm, EMCS, etc.)

1.11.1.4 Outlet Configurations

Show all unique outlet configurations, including connector types and quantities and labeling conventions

1.11.1.5 Rack, Cabinet, and Equipment Elevations

Show individual elevations of each type of rack, cabinet, or other equipment or termination enclosures, including cable management, grounding, power, patch panels, connectors, etc.

1.11.1.6 Enlarged Room Plans

Provide enlarged room plans drawn at $\frac{1}{4}" = 1'$ of every room containing one or more racks or cabinets. Include scaled outlines of racks, backboards, cabinetss, cable

1.11.1.7 Details

Provide installation details that fully define installation requirements for typical and special conditions, including all termination enclosures, break-out boxes, consolidation point or box which includes termination or cable management hardware. Provide maintenance details and elevations. Provide duct bank configuration and construction details

1.11.1.8 Riser Diagrams

Provide a seperate riser diagram for each system, showing all major components, typical minor components (speakers, volume controls, etc.) and interconnecting cabling.

1.11.1.9 Details

Provide installation details that fully define installation requirements for typical and special conditions.

1.11.2 Specifications

Submit prescriptive specification sections to specify the quality, characteristics, installation procedures and testing requirements for all items of the proposed communications design.

1.11.3 Design Analysis Narrative

The design analysis shall contain a description and analysis of the communications portions of the design. Special features, unusual requirements should be noted. Narrative must address all technical requirements identified in section 01 86 29 COMMUNICATIONS.

1.11.4 Design Analysis Calculations

Backup data shall be furnished to support basic design decisions related to sizing of cable trays and conduits.

1.12 FIRE PROTECTION

1.12.1 DRAWINGS

Design will be an extension of the 65% submittal, incorporating all comments thereto and any revised criteria, all as specifically directed by the District Office. All conflicts, lack of specific criteria, and/or direction, inconsistencies, ambiguities, and lack of thorough understanding of the nature and scope of work shall be resolved prior to starting final design work. The fire protection plans shall show the following: entire sprinkler system; fire detection and mass notification system, to include control panels, remote annunciators, alarm notification devices, and each initiating device; fire walls; fire partitions; building separations; other fire protection features. Life Safety and Building Code plans shall be submitted for review and shall have the Fire Protection Engineer of Record's (FPE) stamp and seal. A letter certifying the project per UFC 3-600-01 shall be submitted with this package signed by the FPE.

1.12.2 TECHNICAL GUIDE SPECIFICATIONS

The following UFGS guide specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product and installation requirements for the facility:

21 13 13.00 10	Wet-Pipe Sprinkler Systems, Fire Protection
21 13 18.00 40	Pre-Action Sprinkler Systems, Fire Protection
21 22 00.00 40	Clean Agent Fire Extinguishing Systems
21 30.00	Fire Pumps
28 31 76	Interior Fire Alarm and Mass Notification System Current Loop

All items identified in the specifications not required shall be marked for deletion in accordance with the requirements of Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES. Those items of equipment, materials, or installation requirements that are required are not permitted to be modified or changed from that presently shown. Government approval is required for the final submittal of these guide specifications.

1.12.3 DESIGN ANALYSIS

The final design analysis will be an extension of the 65% design analysis and shall be complete for every item covered in the design and will include, but not be limited to, the following:

- a. List of design criteria.
- b. Design conditions.
- c. Design calculations.
- d. Complete description of system alarm zones.
- e. Complete description of system sprinkler system.
- f. Complete description of the building fire protection features.
- g. Other pertinent information of value for future use in construction contract administration, substantiation of design methods, or permanent record shall be included.

1.13 ENVIRONMENTAL PROTECTION COMPLIANCE

1.13.1 SPECIFICATIONS

The Contractor shall be responsible for updating/revising UFGS Specification Section 01 57 20.00 10 ENVIRONMENT PROTECTION which is furnished with Division 1 of this RFP. Any additional environmental compliances that may be required for this project shall be included. This section shall be included with the 100% Design Specifications rather it has any revisions or not. See 65% submittal requirements for additional information.

1.13.2 DESIGN ANALYSIS

The Contractor shall update/revise the chapter in the 65% Design Analysis entitled: "Environmental Protection Compliance".

1.13.3 SUBMITTAL OF ENVIRONMENTAL APPROVALS, PERMIT APPLICATION AND ASSOCIATED DOCUMENTS

Any revisions that may be required to the permits and/or approvals which were submitted with the 65 percent submittals shall be submitted with final design submittals. If these submittals were not required to be submitted to the governing agencies for a permit or approval at 65% design, they shall be submitted with the 100% Design documents. Any additional approvals and/or Permits required, which were not previously submitted, shall be submitted to the Corps of Engineers with sufficient time for the permits to be obtained prior to construction commencing or with the final design submittals.

1.14 SUSTAINABLE DESIGN

Update as required from the 65% design.

PART 2 NOT USED

PART 3 NOT USED
-- End of Section --

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SECTION 01 33 29

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02/21

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SECTION 01 33 29

SUSTAINABILITY REQUIREMENTS AND REPORTING
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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.

COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) (WHITE HOUSE)

HPSB Guiding Principles	(2016) Guiding Principles for Sustainable Federal Buildings and Determining Compliance with the Guiding Principles for Sustainable Federal Buildings
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GREEN BUILDING INITIATIVE (GBI)

GBI DOD GP Compliance	(2017) GBI Department of Defense Guiding Principles Compliance Program for New Construction
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GBI Green Globes for NC	(2017) Green Globes(tm) for New Construction Technical Reference Manual
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GREEN BUSINESS CERTIFICATION INC. (GBCI)

GP Assessment (DOD)	Guiding Principles Assessment for Department of Defense
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INTERNATIONAL CODE COUNCIL (ICC)

ICC IGCC	(2018) International Green Construction Code
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SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 008	(2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition
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U.S. DEPARTMENT OF AGRICULTURE (USDA)

FSRIA 9002	Farm Security and Rural Investment Act Section 9002 (USDA BioPreferred Program)
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U.S. DEPARTMENT OF DEFENSE (DOD)

ECB 2023-1	Meet the Requirements of ASHRAE 90.1-2019 to Optimize Energy Performance
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UFC 1-200-02	(2020; with Change 1, 2020) High Performance and Sustainable Building
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Requirements

UFC 3-210-10 (2015; with Change 3, 2020) Low Impact Development

UFC 3-600-01 (2016; with Change 6, 2021) Fire Protection Engineering for Facilities

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED v4 BD+C LEED v4 Building Design and Construction

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 433.300 Subpart C - Green Building Certification for Federal Buildings

40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUMMARY

This section includes requirements for Sustainability documentation and reporting submittals per the federally mandated High Performance and Sustainable Building (HPSB) or HPSB "Guiding Principles" (GP), and Third Party Certification (TPC) requirements, in accordance with UFC 1-200-02 High Performance and Sustainable Building Requirements, and other identified requirements.

1.3 SUBMITTALS

Government approval is required for submittals with a "G". Submittals not having a "G" 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

Preliminary High Performance and Sustainable Building Checklist; G

Sustainability Action Plan; G

Preliminary Sustainability eNotebook; G

SD-05 Design Data

Interim Design High Performance and Sustainable Building Checklist; G

Interim Design Sustainability eNotebook; G

Final Design High Performance and Sustainable Building Checklist; G

Final Design Sustainability eNotebook; G

SD-06 Test Reports

Third Party Certification Design Compliance Report; G

SD-11 Closeout Submittals

Final High Performance and Sustainable Building Checklist; G

Final Sustainability eNotebook; G

The Sustainability eNotebook shall include all relevant documentation pertaining to HPSB and TPC compliance including, but not limited to:

- Commissioning Reports
- Energy Efficient Products
- Indoor Water Use
- Low Emitting Materials
- Bio-Based Products
- Recycled Content
- Certification of EPA Designated Items
- Certification of USDA Designated Items
- Construction Waste Management
- Sustainability Submittals

Amended Final Sustainability eNotebook; G

Amended Final High Performance and Sustainable Building Checklist;
G

Third Party Certification Certificate, Assessment, or Validation
and Compliance Report; G

1.4 GUIDING PRINCIPLES VALIDATION (GPV)

Provide the following sustainability activities and documentation to verify achievement of HPSB Guiding Principles Validation (GPV):

- a. Analysis of each Guiding Principle Requirement and how project complies. Include final government approved narrative(s) in the HPSB Checklist submittal. Multiple checklists indicate multiple buildings that require individual HPSB Checklist tracking.
- b. No changes to the HPSB Checklist are allowed without approval from the Contracting Officer, in accordance with Section 01 33 00 SUBMITTAL REQUIREMENTS. Immediately bring to the attention of the Contracting Officer any project changes that impact meeting the approved HPSB Guiding Principles Requirements for this project. Demonstrate the change will not increase the life-cycle cost and maintains or improves the building performance.
- c. Documentation of all work required to incorporate the applicable HPSB Guiding Principles requirements indicated on the HPSB Checklist and in this contract, including all "S" submittals.
- d. Sustainability Action Plan.
- e. Design and construction related documentation for the project

Sustainability eNotebook and keep updated with regularly-scheduled Construction Quality Control Meetings. Include design and construction related documentation containing the following components:

- (1) HPSB Checklist(s)
- (2) Sustainability Action Plan
- (3) Documentation illustrating HPSB Guiding Principles Requirements compliance

1.4.1 Sustainability Action Plan

Include the following information in the Sustainability Action Plan:

- a. Analysis of each HPSB Guiding Principles Requirement and how project will comply. Final government approved narrative(s) must be included in the HPSB Checklist submittal.
- b. Name and contact information for: Contractor's Point of Contact (POC) ensuring sustainability goals are accomplished and documentation is assembled. For TPC that include on-site visit by third party representative, provide list of required attendees.
- c. Indoor Air Quality plan.

1.4.2 Calculations

Provide all design data, calculations, product data, labels and product certifications required in this specification to demonstrate compliance with the HPSB Guiding Principles Requirements.

1.5 SUSTAINABILITY SUBMITTALS

Provide HPSB Checklist and other documentation in the Sustainability eNotebook to indicate compliance with the sustainability requirements of the project.

1.5.1 High Performance Sustainable Building (HPSB) Checklist

Provide construction documentation that provides proof of, and supports compliance with, the completed HPSB Checklist.

1.5.1.1 HPSB Checklist Submittals

Submit updated HPSB Checklist with each Sustainability eNotebook submittal. Include the final HPSB Checklist(s) with the interim DD1354 Real Property Record Submittal.

1.5.2 Submittals for Sustainability Documentation

Edit UFGS specifications to remove the "S" submittal designation. Submittals tagged with the "S" designations may be retained in the specification as applicable, but remove the "S" code to make it an FIO submittal. Follow the directions already contained in this section for what to include in the Sustainability eNotebook.

Various sections of this contract contain submittals that may count towards the sustainability documentation requirements required by this section.

Submit the GPV and TPC sustainability documentation required in this section as part of the Sustainability eNotebook for all affected UFGS Sections.

- a. Highlight GPV and TPC compliance data in each sustainability documentation submittal.
- b. Bookmark sustainability documentation submittals as required in paragraph SUSTAINABILITY ENOTEBOOK below.
- c. Ensure all approved sustainability documentation submittals are included in each Sustainability eNotebook submittal.

1.5.3 Sustainability eNotebook

The Sustainability eNotebook is an electronic organizational file that serves as a repository for all required sustainability submittals. To support documentation of compliance with an approved HPSB and TPC checklist, provide and maintain a comprehensive and current Sustainability eNotebook. Include all required data in Sustainability eNotebook, to support full compliance with the HPSB Guiding Principles Requirements, including:

- a. HPSB checklist
- b. Sustainability Action Plan
- c. Calculations
- d. Labels
- e. Sustainability documentation submittals contained in various UFGS sections of the contract
- f. Certifications, assessments, or validations and compliance report
- g. TPC documentation required in paragraph THIRD PARTY CERTIFICATION (TPC).

1.5.3.1 Sustainability eNotebook Format

Provide Sustainability eNotebook in the form of an Adobe PDF file; bookmark each HPSB Guiding Principles Requirement, TPC requirement, and sub-bookmark at each document. Match format to HPSB Guiding Principles numbering system indicated herein. Maintain up-to-date information, such as spreadsheets, templates, with each current submittals. For TPC projects, provide a second Table of Contents using TPC numbering system, for maintaining documentation unique to TPC.

Contracting Officer may deduct from the monthly progress payment accordingly if Sustainability eNotebook information is not current and on track per project goals.

1.5.3.2 Sustainability eNotebook Submittal Schedule

Provide Sustainability eNotebook Submittals at the following milestones of the project:

- a. Preliminary Sustainability eNotebook

Submit preliminary Sustainability eNotebook with updated Preliminary High Performance and Sustainable Building Checklist and TPC checklist at the first post award meeting.

b. Interim Design Sustainability eNotebook

Submit updated Sustainability eNotebook with updated Interim Design High Performance and Sustainable Building Checklist with TPC Checklist with the with the 65% Submittal design package, in accordance with Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES. If issues relating to achieving the sustainability goals of the project are subsequently identified, identify reasons and mitigation from DOR, and resubmit to the Contracting Officer for approval.

c. Final Design Sustainability eNotebook

Submit updated Sustainability eNotebook with updated Final Design High Performance and Sustainable Building Checklist with TPC Checklist with the with the 100% Submittal design package, in accordance with Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES. If issues relating to achieving the sustainability goals of the project are subsequently identified, identify reasons and mitigation from DOR, and resubmit to the Contracting Officer for approval.

d. Third Party Certification Design Compliance Report

Obtain Third Party Certification Design Compliance Report after final design submittal is approved. Submittal must indicate 100 percent compliance with applicable design requirements. File approved submittal in the Sustainability eNotebook.

e. Construction Quality Control Meetings.

Provide up-to-date GP and TPC documentation in the Sustainability eNotebook and TPC Online tool for each meeting.

f. Final Sustainability eNotebook

Submit updated Sustainability eNotebook with updated Final High Performance and Sustainable Building Checklist with TPC Checklist, at Beneficial Occupancy Date (BOD). Final progress payment retainage may be held by Contracting Officer until Final Sustainability construction phase documentation is complete.

1.6 DOCUMENTATION REQUIREMENTS

- a. Incorporate each of the following HPSB Guiding Principles requirements into project and provide documentation that proves compliance with each listed requirement. Items below are organized by HPSB Guiding Principles. For life-cycle cost analysis requirements, one document with all analyses is acceptable, with Contracting Officer approval.
- b. For each of the following paragraphs that require the use of products listed on Government-required websites, provide documentation of the process used to select products, or process used to determine why listed products do not meet project performance requirements.

1.6.1 Integrated Design Process

For the submittal documentation below, demonstrate compliance with UFC 1-200-02.

1.6.1.1 Design Submittal Documentation

- a. List the sustainability integrated design team, and a description of their roles in all stages of a project's planning and delivery:
 - (1) Include Contractor's Sustainability Coordinators; Architecture and Engineering disciplines involved on the project, and the DOR in charge of the overall project and each discipline; Construction Subcontractors and the company representatives that align with each architectural and engineering discipline, Planning, Public Works, Environmental Specialist and other appropriate installation personnel.
 - (2) Describe their roles and responsibilities and plan-of-action for how each team member will be involved to achieve the project sustainability requirements, and how the Contractor will coordinate with Government personnel.
 - (3) Maintain an up-to-date list with descriptions throughout the project.
- b. Provide narratives that:
 - (1) Indicate performance goals for siting, energy, water, materials, and indoor environmental quality along with other comprehensive design goals and ensures incorporation of these goals throughout the design and life cycle of the building.
 - (2) Demonstrate integration of the goals into design and construction.
 - (3) Demonstrate collaboration with other providers, such as Commissioning Authority and Third Party Certification.

1.6.2 Commissioning (Cx)

Develop and incorporate Commissioning requirements into the documents, in accordance with Section 01 91 00.15 10 TOTAL BUILDING COMMISSIONING.

1.6.3 Optimize Energy Performance

For the submittal documentation below, demonstrate compliance with UFC 1-200-02 and ECB 2023-1.

1.6.3.1 Design Submittal Documentation

- a. Narrative that provides a summary of:
 - (1) The process leading to the analysis of at least three energy-efficient solutions to enhance the energy performance of the building envelope for both Bldg. 631 and the Comm Hut and the selected design solution(s). After the selection of the building envelope, three analyses shall be performed for the type of HVAC system to be used for each of the buildings.

- (2) The specific energy standard and version utilized; and the software used in the analysis
- (3) The calculated energy consumption and energy use intensity (EUI in kBTU/sf/yr) of the baseline building and the proposed design alternatives

b. A minimum of the following energy modeling files and summaries for the baseline and proposed alternatives:

- (1) Input, schedules and libraries; and output
- (2) Calculated energy use by energy type
- (3) Calculated energy use by building system

c. The life-cycle cost analysis input and output files for the baseline and the proposed alternatives

1.6.3.2 Construction Submittal Documentation

Provide revised energy modeling for actual system constructed.

1.6.4 Energy Efficient Products

Provide only energy-using products that are Energy Star rated or have Federal Energy Management Program (FEMP) recommended efficiency. Where Energy Star or FEMP recommendations have not been established, provide most efficient products that are life-cycle cost-effective. Provide only energy using products that meet FEMP requirements for low standby power consumption. Energy efficient products can be found at:
<https://www.energy.gov/eere/femp/federal-energy-management-program> and <http://www.energystar.gov/>.

For construction submittal documentation, provide proof that product is labeled energy efficient and complies with the cited requirements.

1.6.5 On-site Renewable Energy Generation

For the submittal documentation below, demonstrate compliance with UFC 1-200-02.

1.6.5.1 Design Submittal Documentation

Provide life-cycle cost analysis (LCCA). When found to be LCCE, do one of the following options:

- a. Provide design drawings and calculations that demonstrate total on-site renewable energy as an annual percentage of proposed building energy consumption in kBTU/year; and provide equipment ratings, and calculations that demonstrate the generation capacity of the system in kBTU/year for thermal and kwh for electricity.
- b. Provide documentation that renewable energy development at the Installation level is planned.

1.6.6 Solar Domestic Hot Water (SDHW)

For the submittal documentation below, demonstrate compliance with

UFC 1-200-02.

1.6.6.1 Design Submittal Documentation

Provide life-cycle cost analysis (LCCA). When found to be LCCE, provide design drawings and calculations that demonstrate total on-site renewable energy as an annual percentage of proposed building energy consumption in kBTU/year; and provide equipment ratings, and calculations that demonstrate the generation capacity of the system in kBTU/year for thermal.

1.6.7 Building-level Power Metering

Provide building-level meters for electricity, natural gas, and steam where applicable.

1.6.7.1 Design Submittal Documentation

Provide design drawings that highlight meter locations on the site.

1.6.7.2 Construction Submittal Documentation

Provide manufacturer's data validating compatibility with base-wide system and component advanced meter requirements.

1.6.8 Indoor Water Use

Provide Construction Documentation proof that fixtures are labeled EPA WaterSense, for products available with EPA WaterSense labeling; for all other fixtures, proof they comply with EPA WaterSense efficiency requirements.

1.6.9 Indoor Water Metering

Provide building-level meters for potable water use. Provide the requirements cited in the following paragraphs:

1.6.9.1 Design Submittal Documentation

Provide design drawings that highlight meter locations on the site.

1.6.9.2 Construction Submittal Documentation

Provide manufacturer's data validating compatibility with base-wide system and component advanced meter requirements.

1.6.10 Outdoor Water Use

Outdoor irrigation will not be provided on this project.

1.6.10.1 Construction Submittal Documentation

Provide manufacturer's data validating compatibility with base-wide system and component advanced meter requirements.

1.6.11 Alternative Water

Use alternative sources of water to replace potable water usage, when life-cycle cost-effective and to the extent permitted by local laws and regulations.

1.6.11.1 Design Submittal Documentation

- a. Provide design drawings and calculations that demonstrate the alternative water sources used, potable water savings as compared to non-alternative water sourcing, and projected annual potable water savings.
- b. Provide life-cycle cost analysis (LCCA).

1.6.12 Stormwater Management

Develop and incorporate stormwater requirements into the documents. Submit design and construction documentation required by UFC 3-210-10 and Service processes, as proof of this tracking requirement.

1.6.13 Ventilation and Thermal Comfort

For the submittal documentation below, demonstrate compliance with UFC 1-200-02.

1.6.13.1 Design Submittal Documentation

Provide design drawings and calculations that demonstrate HVAC systems and the building envelope have been designed to meet the requirements.

1.6.14 Daylighting

For the submittal documentation below, demonstrate compliance with UFC 1-200-02 to the extent outlined in this RFP (Heritage Room, Transition Zone, and atrium).

1.6.15 Moisture Control

Provide the following:

1.6.15.1 Design Submittal Documentation

Provide drawings of building envelope details and HVAC humidity controls.

1.6.15.2 Construction Submittal Documentation

Ensure construction materials are separated and protected in accordance with other sections in this contract document, with adequate humidity controls during construction. In accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA, includes plan for ongoing building moisture control.

Coordinate with the moisture control requirements of Section 01 45 00.00 10 QUALITY CONTROL.

1.6.16 Reduce Volatile Organic Compounds (VOC) (Low-Emitting Materials)

Meet the requirements of Table 3-1 at the end of this specification.

For Construction submittal documentation, provide certifications or labels that demonstrate compliance with cited requirements, based on the attached TABLE 3-1.

1.6.17 Indoor Air Quality During Construction

Prior to construction, create indoor air quality plan. Develop and implement an IAQ construction management plan during construction and flush building air before occupancy.

For renovation of unoccupied existing buildings, meet the requirements of ICC IGCC 1001.3.1.5 (10.3.1.4) Indoor Air Quality (IAQ) Construction Management.

Provide documentation showing that after construction ends and prior to occupancy, HVAC filters were replaced and building air was flushed out in accordance with the cited standard.

1.6.18 Recycled Content

Comply with 40 CFR 247. Refer to:
<https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>
 for assistance identifying products cited in 40 CFR 247. Selected products must comply with non-proprietary requirements of the Federal Acquisition Regulation and must meet performance requirements.

1.6.18.1 Construction Submittal Documentation

- a. Provide manufacturers' documents stating the recycled content by material, or written justification for claiming one of the exceptions allowed on the cited website.
- b. Substitutions: Submit for Government approval for proposed alternative products or systems that provide equivalent performance and appearance and have greater contribution to project recycled content requirements. For all such proposed substitutions, submit with the Sustainability Action Plan accompanied by product data demonstrating equivalence.
- c. In order to complete compliance with FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items and and FAR 52-223-17 Affirmative Procurement of EPA designated items in Service and Construction Contracts, submit the Certification of EPA Designated Items as part of the Final Sustainability eNotebook. 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:
 - (1) The product does not meet appropriate performance standards;
 - (2) The product is not available within a reasonable time frame;
 - (3) The product is not available competitively (from two or more sources);
 - (4) 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, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, exemptions (1), (2), (3), or (4), as indicated, and comments. Recycled content values may be determined by weight or volume percent, but must be consistent throughout.

1.6.19 Bio-Based Products

Provide products and materials composed of the highest percentage of bio-based materials (including rapidly renewable resources and certified sustainably harvested products), consistent with FSRIA 9002 USDA BioPreferred Program, to the maximum extent possible without jeopardizing the intended end use or detracting from the overall quality delivered to the end user and when available at a reasonable cost. Use only supplies and materials of a type and quality that conform to applicable specifications and standards.

Comply with FSRIA 9002 USDA BioPreferred Program. Refer to www.biopREFERRED.gov for the product categories and BioPreferred Catalog. Selected products must comply with non-proprietary requirements of the Federal Acquisition Regulation and must meet performance requirements. Provide the following documentation:

- a. USDA BioPreferred label for each product; for bio-based products used on project but not listed with BioPreferred program, provide bio-based content and percentage.
- b. In order to complete compliance with FAR 52.223-1 Biobased Product Certification, refer to submittal requirement for biobased products in FSRIA 9002

1.6.20 Waste Material Management (Recycling - Design)

For the submittal documentation below, demonstrate compliance with UFC 1-200-02.

For design submittal documentation, provide drawing showing an appropriately sized and placed dedicated storage area for recyclables.

1.6.21 Waste Material Management (Recycling - Construction)

Divert demolition and construction debris in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.6.22 Additional Sustainability Requirements

Provide the additional sustainability requirements cited in this paragraph.

1.6.22.1 Third Party Certification (TPC) Documentation

Third Party Certification certificate, assessment, or validation, and compliance report requirements for Bldg. 631 are in addition to all requirements under header above GUIDING PRINCIPLES VALIDATION (GPV).

1.6.22.1.1 TPC Registration Required

Register and achieve Third Party Certification (TPC), by meeting all TPC

and project requirements to achieve GP Assessment (DOD) or GBI DOD GP Compliance certification, assessment, or validation. An equivalent TPC organization must demonstrate equivalency for Government consideration and meet the requirements of 10 CFR 433.300, prior to use on the project. Third Party Certification is met when Government receives TPC organization certificate, assessment, or validation and compliance report.

Register project with TPC organization using the following format and content:

- a. Project Title First Line: Building Owner (US Air Force), Building Name
- b. Project Title Second Line: P#, Project Name
- c. Project Address: UIC (Installation code), Category code, RPUID (Real Property Unique Identifier) Number
- d. Project Owner Organization: US Air Force
- e. Primary Contact, Project Owner: Karen Jarvis
- f. Building Owner Organization: US Air Force
- g. Building Owner Organization Project Number
- h. Additional Contact, Building Owner: Base Civil Engineer

1.6.22.1.2 TPC Management and Certification

Execute the following TPC Certification, assessment, or validation requirements:

- a. Refer to checklist at the end of this specification section.
- b. Immediately bring to the attention of the Contracting Officer any project changes that impact meeting the approved TPC Requirements for this project. Demonstrate the change will not increase the life-cycle cost and maintains or improves the building performance.
- c. Complete all design and construction work to incorporate the applicable TPC Requirements.
- d. Maintain the design and construction related information in the Sustainability eNotebook pertaining to additions and changes to the approved sustainability requirements. Maintain the Sustainability eNotebook in electronic format. Refer to explanation in the paragraph SUSTAINABILITY eNOTEBOOK. Provide the following components in the Sustainability eNotebook, in addition to the GPV components listed above:
 - (1) TPC Checklist
 - (2) Completed TPC forms. Transmit by the method required by TPC organization.
 - (3) Copy of all correspondence with the TPC organization. Provide proof of TPC registration.

- (4) Documentation illustrating compliance with TPC requirements and additional documentation as requested by the Third Party certifier.
 - (5) TPC Award Certificate, assessment or validation and compliance report.
- e. Provide the following information in the Sustainability Action Plan. Provide this TPC information in addition to the Sustainability Action Plan items above:
 - (1) Planned method to achieve each TPC requirement.
 - (2) Provide analysis of each TPC credit and how project will comply.
 - (3) Provide names and contact information for: Contractor sustainability point of contact (POC) and other names of sustainability professionals on the Contractor's Staff responsible for ensuring TPC sustainability goals are accomplished and documentation is assembled.
- f. Bear all costs associated with designing, constructing, demonstrating, and documenting that project complies with approved TPC requirements, including but not limited to:
 - (1) Registration, review, certification, assessment, or validation fees.
 - (2) Online TPC management and documentation.
 - (3) Obtaining TPC certification, assessment, or validation based on Government-approved sustainability goals.
 - (4) Design and construction work required to incorporate TPC requirements.
 - (5) Submittals required to demonstrate compliance with Government approved TPC checklists.
- g. Provide all design data, calculations, product data, and certifications, assessments, or validations required in this specification to demonstrate compliance with the TPC Requirements.
- h. Provide all online TPC management and documentation.
- i. Provide all required responses to third party organization.
- j. Facilitate and participate in required TPC site visit. Coordinate with the Executing DOD Service's Project Manager and Design Manager, to determine participating team members. Include Commissioning provider on applicable projects.
- k. Provide TPC Certificate, assessment, or validation. Provide TPC compliance report that includes level achieved and reasons for non-compliance or not applicable elements. Use the following format to create the Plaque, Certificate, assessment, or validation, compliance report, and Letter of Congratulations. Forward information to parties designated by Contracting Officer.
- l. Once Final Certification is achieved, turn over Administrative rights

to online TPC to the Base Civil Engineer or designee, contact information provided by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SUSTAINABILITY COORDINATION

Provide sustainability focus and coordination at all meetings to achieve sustainability goals. Coordinate meeting requirements with other UFGS Sections meeting requirements in this project. Ensure the designated TPC accredited sustainability professional responsible for GP and TPC documentation participates in these meetings to coordinate documentation completion. Review GP and TPC sustainability requirements, HPSB Checklist and TPC documentation, Sustainability Action Plan, and completeness status of Sustainability eNotebook, and TPC status at the following meetings:

- a. Pre-Construction Conference
- b. Construction Quality Control Meetings

Refer to Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES for Post Award Meetings.

- c. Post Award Meeting
- d. Design Quality Assurance Meetings
- e. Design Complete Review Meetings

Conduct review no later than 60 days after final design complete submission and identify any outstanding issues that affect correct completion of all documentation requirements, and actions that will achieve requirements. Conduct corrective actions.

- f. TPC On-site Visit

Execute, coordinate, and facilitate on-site visit by third party representative no later than 60 days before final turnover, or as required by TPC organization, whichever is greater.

- g. Facility Turnover Meetings

Conduct review no later than 60 days before final turnover and identify any outstanding issues that affect correct completion of all documentation and final TPC certification, assessment or validation, and actions that will achieve requirements. Conduct corrective actions prior to turnover, to ensure all requirements are achieved.

3.2 THIRD PARTY CERTIFICATION CERTIFICATE, ASSESSMENT, OR VALIDATION AND COMPLIANCE REPORT

Finalize the process requirements and obtain the TPC Certificate, assessment, or validation, and compliance report, indicating completion of the project's sustainability goals. Include TPC compliance report with final TPC scoresheet as applicable.

Deliver one original certificate, assessment, or validation, and compliance report to Contractor Officer, unless otherwise instructed.

3.3 TABLE 3-1 VOLATILE ORGANIC COMPOUNDS (VOC) (LOW EMITTING MATERIALS) REQUIREMENTS

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements				
Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)				
MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Adhesives and Sealants	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)	or	Adhesives (carpet, resilient, wood flooring; base cove; ceramic tile; drywall and panel; primers) Sealants (acoustical; firestop; HVAC Air duct; primers) Caulks	SCAQMD Rule 1168 (Use "other" category for HVAC duct sealant) (for firestop adhesive, UFC 3-600-01 overrides conflicting requirements)
			Aerosol adhesives	Section 3 of Green Seal Standard GS-36 (except: cleaners, solvent cements, and primers used with plastic piping and conduit in plumbing, fire suppression, and electrical systems; HVAC air duct sealants when the application space air temp is less than 40 F (4.5 C).

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements				
Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)				
MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Paints and Coatings	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)	or	Flat and nonflat, nonflat high-gloss, specialty, basement specialty, fire-resistive, floor, low-solids, rust preventative, wood, reflective wall coatings; concrete/masonry sealers; primers; sealers; undercoaters; shellacs (clear and opaque); stains; varnishes; conjugated oil varnish; lacquer; clear brushing lacquer	Green Seal Standard GS-11

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements				
Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)				
MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Paints and Coatings	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)	or	Concrete curing compounds; dry fog, faux finishing, graphic arts (sign paints), industrial maintenance, mastic texture, metallic pigmented, multicolor, recycled coatings; pretreatment wash primers, reactive penetrating sealers; specialty primers, wood preservatives, and zinc primers	California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings or SCAQMD Rule 1113r
Paints and Coatings	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)	or	High-temperature coatings; stone consolidants; swimming-pool coatings; tub- and tile-refining coatings; and waterproofing membranes	California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)				
MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Floor Covering Materials	For carpet, all locations: CDPH/EHLB/Standard Method V1.1 (California Section 01350) or label for Section 9 of CDPH/EHLB/Standard Method V1.1 (California Section 01350)		none	none
Insulation	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)		none	none

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements				
Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)				
MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Composite Wood, Wood Structural Panel, and Agrifiber Products no added urea-formaldehyde resins including laminating adhesives for composite wood and agrifiber assemblies - particleboard, medium density fiberboard (MDF), wheatboard, strawboard, panel substrates, door cores	Third-party certification (approved by CARB) of California Air Resource Board's (CARB) regulation, Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products	or	none	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications) (except: Structural panel components such as plywood, particle board, wafer board, and oriented strand board identified as "EXPOSURE 1," "EXTERIOR," or "HUD-APPROVED" are considered acceptable for interior use.)
Office Furniture Systems and Seating installed prior to occupancy	ANSI/BIFMA X7.1 ANSI/BIFMA X7.1: (95-percent of installed office furniture system workstations and seating units) Section 7.6.2 of ANSI/BIFMA e3 (50-percent of office furniture system workstations and seating units)		none	none

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IGCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Ceiling and Wall assemblies and systems including: acoustical treatments; ceiling panels and tiles; tackable wall panels and coverings; wall coverings; wall and ceiling paneling and planking	CDPH/EHLB/Standard method V1.1 (California Section 01350) (Use "office" or "classroom" space limits for all applications)		none	none

-- End of Section --

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SECTION 01 33 39.00 10

ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS

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SECTION 01 33 39.00 10

ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS
10/15

PART 1 GENERAL

This project includes BIM and CAD requirements during Design and Construction phase of the project.

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.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 19005-3	(2012) Document Management -- Electronic Document File Format for Long-Term Preservation -- Part 3: Use of ISO 32000-1 with Support for Embedded Files (PDF/A-3)
ISO 19115-1	(2014) Geographic Information -- Metadata -- Part 1: Fundamentals
ISO 32000-1	(2008) Document Management -- Portable Document Format -- Part 1: PDF 1.7

NATIONAL INSTITUTE OF BUILDING SCIENCES (NIBS)

NBIMS-US	(V3) National BIM Standard - United States
NCS	(V6) United States National CAD Standard

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 Advanced Modeling

A subset of geospatial technologies as defined EM 1110-1-2909 GEOSPATIAL DATA AND SYSTEMS to include BIM and CAD. Models and drawings that form a digital representation of the project, or part thereof, comprised of "Model Elements" with "Facility/Site Data."

1.2.2 Model Element

A self-contained element with a unique identification, whose behavior and properties are defined by Facility/Site Data and software processes. Model

Elements can represent a physical entity, such as a pump, a concrete wall, or a utility vault and range from the simple to the complex.

1.2.3 Facility/Site Data

The non-graphical information attached to objects in the Model that defines various characteristics of the object. Facility/Site Data can include properties such as parametric values that drive physical sizes, material definitions and characteristics (e.g. wood, metal), manufacturer data, industry standards (e.g. AISC steel properties), and project identification numbers. Facility/Site Data can also define supplementary physical entities that are not shown graphically in the Model, such as the system of a duct, hardware on a door, content of conduit, or transformer properties.

1.2.4 USACE BIM/CIM Platform Configuration Standards - Templates, Workspaces, Catalogs, and Environments

a. USACE Revit Templates:

The USACE has developed Revit Templates specific to USACE BIM standards; these templates are Revit version specific. The USACE Revit templates are discipline specific and include family content pertinent to that discipline. The Templates share standard symbology such as annotation families, line styles, and text styles. The Templates include pre-defined shared parameters.

1.2.5 IFC

Industry Foundation Class, a standard and file format used for the exchange of BIM data; see www.iai-tech.org. For this specification, IFC does not mean "Issued For Construction."

1.2.6 Model Uses

Reference NBIMS-US A Model Use is a method or strategy of applying modeling during a facility's life cycle to achieve one or more specific objectives.

1.2.7 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.erd.dren.mil/>.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation 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

Advanced Modeling Project Execution Plan (PxP); G, DO

PxP Demonstration; G, DO

SD-11 Closeout Submittals

Record Advanced Modeling Submittal; G, DO

As-built Drawings; G, RO

1.4 QUALITY ASSURANCE

1.4.1 Advanced Modeling Project Execution Plan (PxP)

Develop an Advanced Modeling Project Execution Plan ("Plan" or "PxP") documenting mandatory and Contractor-elected BIM Uses, analysis technologies and workflows.

Submit the PxP within 30 days after Notice to Proceed.

Contractors shall use the USACE ADVANCED MODELING (BIM) PROJECT EXECUTION PLAN (PxP) Template located at the USACE CAD/BIM Technology Center website to develop an acceptable Plan and update to include platforms and processes to meet the requirements of the project.

1.4.1.1 USACE Minimum Modeling Matrix (M3)

The USACE Minimum Modeling Matrix (M3) describes the minimum modeling and data requirements by defining the Level of Development ("LOD") and Element Grade. Contractors shall use the M3 Template located at <https://cadbimcenter.erdc.dren.mil/> and submit as part of the PxP.

Per instructions in the M3, Contractor is to identify elements included in the project scope and provide any applicable comments

1.4.2 PxP Demonstration

Within thirty (30) days after the acceptance of the PxP and M3, conduct a demonstration to review the Plan for clarification, and to verify the functionality of planned Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the PxP performing a subsequent demonstration for Government acceptance. There will be no payment for design or construction until the PxP is completed and accepted by the Government. The Government may also withhold payment for unacceptable performance in executing the accepted PxP.

1.4.3 Advanced Modeling Submittals

For each Advanced Modeling Submittal, provide the following:

1.4.3.1 Approved PxP

The most recent approved PxP.

1.4.3.2 List of Submitted Files

A list 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/Site Data. For all Sheet files, include a list of the sheet titles and sheet numbers.

1.4.3.3 Model Submittal Checklist

Complete the USACE BIM/CIM Submittal Checklist and submit with each submittal. Contractor can download the Checklist from the USACE CAD/BIM Technology Center.

1.4.3.4 Advanced Modeling Electronic Files

Include all Advanced Modeling files associated with the scope of work to be provided under this Contract. The Model(s) shall be developed, updated and maintained using Building Information Modeling (BIM) and Computer Aided Design (CAD) supplemented with drawing content as necessary to produce a complete set of Construction Documents.

1.4.3.5 3D Interactive Review Model

A copy of each BIM Model in an approved interactive review format.

1.4.3.6 IFC Coordination View

Provide an IFC Coordination View for all deliverables. Provide exported property set data for all IFC supported named building elements.

1.4.3.7 QC Reports

QC Reports will include the following:

1.4.3.7.1 Model Standards Checks and Reports

Provide QC checks demonstrating adherence to the NCS "BIM Implementation" section. Verify that the Project Facility/Site Data set has no undefined, incorrectly defined or duplicated elements. Identify and report non-compliant elements and submit a corrective action plan. Provide the Government with detailed justification and request Government acceptance for any non-compliant element that the Contractor proposes to be allowed to remain in the Model.

- a. No errors when opening.
- b. No broken Links, References, or X-References.
- c. Minimized extraneous information.
- d. Content uses the coordinate system defined in the approved PxP.
- e. Models share a common alignment point.
- f. Each discipline identified in the approved PxP is represented.

1.4.3.7.2 Graphics Standards Checks and Report

Provide QC checks on all graphic deliverables demonstrating that the fonts, dimensions, symbology and other construction document formatting are compliant with the requirements of this specification. Identify and report non-compliant content.

1.4.3.7.3 CAD Standards Checks and Report

Provide QC checks on CAD Output demonstrating that filenames, sheet borders, layer/level names, and symbology are compliant with the requirements of this specification. Identify and report non-compliant content. Identify and report non-compliant content.

1.4.3.7.4 Other Parameters

Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for acceptance

1.4.3.8 PDF Documents

Provide one PDF file per discipline and one additional PDF file combining all disciplines, following the A/E/C CAD Standard discipline and drawing order.

1.4.4 Advanced Modeling Re-Submittals

For each Advanced Modeling Re-Submittal, provide the following:

1.4.4.1 Government Comments and Contractor Responses

Provide a response to each Government comment for backcheck.

1.4.5 Meetings

1.4.5.1 Pre-Construction Meeting

At minimum discuss the following during the meeting:

- a. The requirement for Advanced Modeling deliverables under this Contract.
- b. Primary roles and responsibilities associated with the development and delivery of the Advanced Modeling submittals under this Contract.
- c. Identify and agree upon a date and attendance list for the meetings described below:

1.4.5.2 PxP Demonstration Meeting

Within thirty (30) days after the acceptance of the PxP and M3, conduct a demonstration to review the Plan for clarification, and to verify the functionality of planned Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the PxP performing a subsequent demonstration for Government acceptance. There will be no payment for design or construction until the PxP is completed and accepted by the Government. The Government may also withhold payment for unacceptable performance in executing the accepted PxP.

1.5 OWNERSHIP AND RIGHTS OF DATA

The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM/CIM Model(s), and Facility/Site Data developed for the Project in accordance with FAR Part 27, clauses incorporated in the contract and (DFARS) 252.227-7022, Government Rights

(Unlimited). The Government may make use of this data following any deliverable.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver Advanced Modeling submittals in an organized and legible manner. Provide submittals adhering to the requirements described below.

1.6.1 Malicious Content

Scan all files for malicious viruses using commercially available scanning program that is routinely updated to identify and remove current virus threats.

1.6.2 Encryption

Deliver Advanced modeling submittals via DoDSAFE. Encrypt deliverable data as directed by Resident Office Engineer. Document the encryption to be used in the PxP.

1.6.3 Protection of GIS Data

GIS source data and product data remain the property of the US Government. The contractor may be required to explain and demonstrate the company's process for protecting all geospatial data, including but not limited to geometry, attributes, metadata, topologies, and relational database schemas and operations used in association with this contract. The contractor may be required to sign a non-disclosure agreement attesting to the same before source data are released. Further information about security and nondisclosure requirements should be obtained from the COR. Some installation map data, source and/or product, may be considered by the government to be "Controlled Unclassified Information" (CUI) also known as "Sensitive but Unclassified" (SBU). The contractor is not authorized to release this information to any third party without the explicit consent of the COR. All source information must be returned to the Government or destroyed upon completion of this contract.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide Advanced Modeling files used to develop the RFP documents as Government Furnished Material (GFM) for the Contractor's use. The information and level of detail contained in the GFM are for information only and shall be verified and updated by the contractor.

The Contractor has the option of preparing their own BIM/CIM models and CAD drawings for design development, use during construction, and record BIM/CAD drawings.

2.1.1 GFM Handover

The Government will provide the GFM via DoDSafe after Notice to Proceed.

2.1.2 GFM File Formats

GFM will be provided in the following file formats:

2.1.2.1 Government Furnished BIM

The GFM will include Autodesk Revit 2020.

2.1.2.2 Government Furnished CIM

The GFM will include Autoddesk Civil3D 2022.

2.1.2.3 Government Furnished GIS

Government will provide the Installation's most current Standard GIS Database Template to the Contractor. Documentation of the required attributes and schema definitions will be provided with the Standard GIS Database Template.

2.1.2.4 Government Furnished CAD

The GFM will include Autodesk AutoCAD 2022.

2.1.3 Variations

The Government makes no warranty that any of the GFM are complete or fully consistent with the contract drawings. The digital files provided are not part of the contract documents. If there is any discrepancy between the BIM/CIM models, the CAD drawings, Bldg. 631's record drawings ("as-builts"), and the contract drawings, the contractor shall field verify conditions. The Government has no responsibility to modify any GFMs due to changes in the design that occur after award.

2.1.4 Model Completion and Quality

The Government makes no guarantee that the BIM/CIM models and CAD files provide the level of completeness or quality required for closeout submittal. It is the Contractor's responsibility to complete the models and facility data to completely and correctly represent the as-built conditions of the facility and the site.

2.1.5 Data Loss, Corruption, and Error

Transfer of GFM files to the Contractor may result in corrupted files resulting in data loss and/or errors. Use of GFM files is at the Contractor's risk. Verify data integrity upon receipt and request a replacement if necessary.

Any adjustment of file structure, format, or software version required to make GFM compatible with the Contractor's computer systems and/or software is the responsibility of the Contractor.

2.2 SYSTEM PLATFORM AND FILE FORMATS

The Contractor shall use the BIM, CIM, and CAD application(s), software(s), and file format(s) described below:

2.2.1 BIM

The BIM submittal format will be Autodesk Revit 2020. The BIM submittals shall be fully operable, compatible, and editable within the native BIM/CIM tools.

2.2.2 CIM

The CIM submittal format will be Autodesk Civil 3D version 2022 or later. The CIM submittals shall be fully operable, compatible, and editable within the native BIM/CIM tools.

2.2.3 CAD

The CAD submittal format will be Autodesk AutoCAD 2022 or later. See 01 78 39.00 24 AS-BUILT DRAWINGS for additional requirements for 2D export of BIM files at contract closeout.

2.2.4 Other Formats

2.2.4.1 IFC

Submit all IFC models in the IFC2x3 Coordination View V2.0 schema.

2.2.4.2 PDF

Utilize PDF file format in accordance with ISO 32000-1 and ISO 19005-3. Provide files from original sources, text-searchable, and saved in "Standard" (uncompressed) resolution whenever possible.

PART 3 EXECUTION

3.1 ADVANCED MODELING REQUIREMENTS

3.1.1 BIM and CIM

All BIM and CIM content authoring, model coordination, content delivery and all other activities and products shall comply with the NCS BIM Implementation section, part "3.0 Basic BIM Guidelines."

All CAD content produced within the BIM and CIM authoring platforms shall comply with the NCS BIM Implementation section, part "2.0 Clarifications."

3.1.1.1 Minimum Modeling Requirements

Model to the requirements of the USACE M3 from USACE CAD/BIM Technology Center website.

3.1.1.2 USACE Software Configuration Standards

b. USACE Revit Templates (Most recent version at the time of Contract award). Download from the USACE CAD/BIM Technology Center website and, if required, upgrade to the Contract approved software version.

3.1.1.3 Classification

All modeled elements shall include Facility/Site Data referencing one or more classification system(s) identified in the M3.

3.1.1.4 Space/Room Data

The Model shall include spatial data defining actual net square footage and data to develop the room finish schedule, including room names and numbers. Include program information to verify design space against

programmed space, using this information to validate area quantities.

3.1.1.5 BIM Coordinate System

- a. State Plane Coordinate System: North Dakota
- b. Zone: North
- c. Units: Imperial Survey Feet
- d. Horizontal Datum: NAD 83
- e. Vertical Datum: NAVD 88

3.1.1.6 CIM Coordinate System

- a. State Plane Coordinate System: North Dakota
- b. Zone: North
- c. Units: Imperial Survey Feet
- d. Horizontal Datum: NAD 83
- e. Vertical Datum: NAVD 88

3.1.1.7 Schedules

Schedules shall comply with the NCS BIM Implementation section, part "2.4 Schedules." Schedules shall be produced from, and remain linked to, the Facility/Site Data within the Model. Any exceptions must be documented in the PxP and submitted to the Geographic BIM Manager, or delegate, for review.

3.1.1.8 Details and Enlarged Sections

Details and enlarged sections shall comply with the NCS BIM Implementation section, part "3.2 Model Coordination and Delivery." All details and enlarged sections necessary for construction shall be derived from the Model when possible. For those details and enlarged sections not derived directly from the Model, Contractor must verify that geometry and data depicting the details and enlarged sections are consistent with Model elements. Details with significant drafted content such as 'standard' and 'typical' details shall not contradict the model and shall utilize the model as an underlay when possible for the purposes of verification and coordination. Three dimensional, isometric, and section isometric details derived from the model are preferred.

3.1.1.9 Drawing Indices

Drawing indices shall comply with the NCS BIM Implementation section, part "2.3 Sheet Organization." Where BIM authoring platform supports it, drawing indices should be derived from a model-driven schedule.

3.1.1.10 CAD Export

CAD content exported from a BIM or CIM modeling platform shall comply with the NCS BIM Implementation section, part "2.0 Clarifications."

3.1.2 CAD

All CAD content produced through native CAD authoring software outside of any BIM or CIM platform shall be compliant with ERDC/ITL TR-19-7 A/E/C CAD Standard and ERDC/ITL TR-19-6 A/E/C Graphic Standard.

3.1.2.1 USACE Software Standards

b. Autodesk AutoCAD Template Files Most recent version at the time of Contract award. Download from the CAD/BIM Technology Center website as part of the A/E/C Work Structure.

3.2 FINAL DESIGN AND FINAL RECORD SUBMITTAL REQUIREMENTS

Follow requirements for Content Delivery from the NCS BIM Implementation section, part "3.0 Basic BIM Guidelines."

3.3 PDF REQUIREMENTS

3.3.1 PDF Bookmarks

3.3.1.1 Construction Document Bookmarks

Bookmark construction document PDF sets to include one Parent Bookmark per Discipline and one Child Bookmark per sheet within each Discipline. Format Parent Bookmarks as "<Discipline>" (i.e. Architectural). Format Child Bookmarks as "<Sheet ID> <Sheet Title>" (i.e. A-101 First Floor Plan).

3.3.1.2 As-Built Bookmarks

Bookmark each RFI, modification, or red-line drawing. Format each As-Built Bookmark as "<Sheet ID> <Sheet Title> <RFI/Modification/Red-Line> <RFI/Modification/Red-Line #>" (i.e. A-101 First Floor Plan RFI 0001).

3.4 MODEL USES

Include all of the following Model Uses in the Project Execution Plan (PxP).

3.4.1 Mandatory Model Uses

The following Model Uses are mandatory:

3.4.1.1 Design Phase Mandatory Model Uses

- a. Design Authoring
- b. 3D Coordination
- c. Progress Review

3.4.1.2 Construction Phase Mandatory Model Uses

- a. 3D Coordination
- b. Record Modeling

3.4.2 Optional Model Uses

Contractor may use other Model Uses as desired.

3.5 AS-BUILT REQUIREMENTS

See Section 01 78 39.00.24 AS-BUILT DRAWINGS for additional as-built and record model quality and deliverable requirements. Deliverable requirements listed in that specification shall not preclude development of the project in BIM/CIM through design and construction as required herein.

-- End of Section --

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GOVERNMENTAL SAFETY REQUIREMENTS

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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 B30.8	(2020) Floating Cranes and Floating Derricks
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
ASSP Z490.1	(2016) Criteria for Accepted Practices in Safety, Health, and Environmental Training

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2019) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment
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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 AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA NPR 8621.1 (2020d) NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

NASA NPR 8715.3 (2017d; Change 1) NASA General Safety Program Requirements

NASA-STD 8719.12 (2021a; Change 2) Safety Standard for Explosives, Propellants, and Pyrotechnics

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Z535.2 (2011; R 2017) Environmental and Facility Safety Signs

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2018; ERTA 1-2 2018) 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 (2019) Standard for Safeguarding Construction, Alteration, and Demolition Operations

NFPA 306 (2019) Standard for the Control of Gas Hazards on Vessels

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 and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 20 Standards for Protection Against Radiation

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 1910.1000	Air Contaminants
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1919	Gear Certification
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
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
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 requirements, 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).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation 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, RO

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G, AO

LHE Inspection Reports

SD-07 Certificates

Crane Operators/Riggers

Standard Lift Plan; G, RO

Critical Lift Plan; G, RO

Activity Hazard Analysis (AHA)

Certificate of Compliance

License Certificates

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 Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.6.1.2.2 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, 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 is 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

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction. 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)

Provide a site-specific Accident Prevention Plan (APP), including Activity Hazard Analyses (AHA), in accordance with EM 385-1-1 Appendix A, for the design team to follow during site visits and investigations. For subsequent visits, update the plan if there are changes in the personnel who will be attending, or the tasks to be performed. Submit the APP for review and acceptance by the Government at least 15 calendar days prior to the start of the design field work. Field work may not begin until the design APP is accepted by the Contracting Officer.

If the design scope includes borings or other subsurface investigations, include in the APP the type of field investigation and verification techniques, such as visual, local utility locating service scanning and third party/subcontractor scanning, potholing, or hand digging within two feet of a known utility that will be required. Mark underground utilities before starting any ground-disturbing actions. Notify the Contracting Officer 15 days prior to the start of soil borings or sub-surface investigations.

Prior to the start of construction incorporate the Design APP into the Construction APP so that one site specific APP exists for the project and submit to the Contracting Officer for acceptance.

1.7.1 ACCIDENT PREVENTION PLAN (APP)

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 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 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.

1.7.3.2 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. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.
- b. 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.
- c. For lifts with anticipated binding conditions.
- d. When erecting cranes.

1.7.3.2.1 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.

1.7.3.2.2 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.

1.7.3.3 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.

1.7.3.4 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).

1.7.3.5 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.

1.7.3.6 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, 29 CFR 1915.89, 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.

1.7.3.7 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 and Section 31 00 00 EARTHWORK (as provided by the designer of record).

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 DFOV 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.

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. The Contracting Officer will provide copies of any required or special forms.
- b. Near Misses: 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 RADIATION SAFETY REQUIREMENTS

Submit License Certificates, employee training records, and Leak Test Reports for radiation materials and equipment to the Contracting Officer and Radiation Safety Office (RSO) for all specialized and licensed material and equipment proposed for use on the construction project (excludes portable machine sources of ionizing radiation including moisture density and X-Ray Fluorescence (XRF)). Maintain on-site records whenever licensed radiological materials or ionizing equipment are on Government property.

Protect workers from radiation exposure in accordance with 10 CFR 20, ensuring any personnel exposures are maintained As Low As Reasonably Achievable.

1.14 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 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work, notify the Contracting Officer immediately and 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 per Section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS. 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 HEC 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 HEC 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, 29 CFR 1915.89, 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 HECF. 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 21.0 through 21.0.06. 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 AWP's must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWP's 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 and federal, state, and local safety 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. As applicable, 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 B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.
- e. As applicable, 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 by 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.
- q. 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 Use of Explosives

Explosives must not be used or brought to the project site.

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.

3.8.2 Utility Location Verification

Physically verify all underground utility locations, including utility depth, by potholing using water, air with non-conductive ends and can include hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

De-energize the circuit for medium voltage cable or direct buried medium voltage cables prior to performing any construction activities within 3 feet of the circuit. If the circuit is reenergized while still exposed, a barrier with danger signs must be provided to limit the approach boundary to 10 feet. De-energize the circuit prior to reentering the 10 feet boundary.

When the excavation will expose and undermine a concrete encased duct bank, submit a concrete encased duct bank electrical support plan for government acceptance prior to undermining the duct bank.

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, 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.

3.10 AIRFIELD SAFETY PRECAUTIONS (DEC 1991)

3.10.1 Definitions

As used in this clause-

a. "Landing areas" means:

(1) The primary surfaces, comprising the surface of the runway, runway shoulders, and lateral safety zones. The length of each primary surface is the same as the runway length. The width of each primary surface is 2,000 feet (1,000 feet on each side of the runway centerline);

(2) The "clear zone" beyond the ends of each runway, i.e., the extension of the primary surface for a distance of 1,000 feet beyond each end of each runway.

(3) All taxiways, plus the lateral clearance zones along each side for the length of the taxiways (the outer edge of each lateral clearance zone is laterally 250 feet from the far or opposite edge of the taxiway, e.g., a 75-foot-wide taxiway would have a combined width of

taxiway and lateral clearance zones of 425 feet); and

(4) All aircraft parking aprons, plus the area 125 feet in width extending beyond each edge all around the aprons.

b. "Safety precaution areas" means those portions of approach-departure clearance zones and transitional zones where placement of objects incident to contract performance might result in vertical projections at or above the approach-departure clearance, or the transitional surface.

(1) The "approach-departure clearance surface" is an extension of the primary surface and the clear zone at each end of each runway, for a distance of 50,000 feet, first along an inclined (glide angle) and then along a horizontal plane, both flaring symmetrically about the runway centerline extended.

(a) The inclined plane (glide angle) begins in the clear zone 200 feet past the end of the runway (and primary surface) at the same elevation as the end of the runway. It continues upward at a slope of 50:1 (1 foot vertically for each 50 feet horizontally) to an elevation of 500 feet above the established airfield elevation. At that point the plane become horizontal, continuing at that same uniform elevation to a point 50,000 feet longitudinally from the beginning of the inclined plane (glide angle) and ending there.

(b) The width of the surface at the beginning of the inclined plane (glide angle) is the same as the width of the clear zone. It then flares uniformly, reaching the maximum width of 16,000 feet at the end.

(2) The "approach-departure clearance zone" is the ground area under the approach-departure clearance surface.

(3) The "transitional surface" is a sideways extension of all primary surfaces, clear zones, and approach-departure clearance surfaces along inclined planes.

(a) The inclined plane in each case begins at the edge of the surface.

(b) The slope of the incline plane is 7:1 (1 foot vertically for each 7 feet horizontally). It continues to the point of intersection with the-

(i) Inner horizontal surface (which is the horizontal plane 500 feet above the established airfield elevation); or

(ii) Outer horizontal surface (which is the horizontal plane 500 feet above the established airfield elevation), whichever is applicable.

(4) The "transitional zone" is the ground area under the transitional surface. (It adjoins the primary surface, clear zone, and approach-departure clearance zone.)

3.10.2 General

a. The Contractor shall comply with the requirements of this clause

while-

- (1) Operating all ground equipment (mobile or stationary);
- (2) Placing all materials; and
- (3) Performing all work, upon and around all airfields.

b. The requirements of this clause are in addition to any other safety requirements of this contract.

3.10.3 Contractor Reporting, Notifications, and Operations Requirements

The Contractor shall:

- a. Report to the Contracting Officer before initiating any work;
- b. Notify the Contracting Officer of proposed changes to locations and operations;
- c. Not permit either its equipment or personnel to use any runway for purposes other than aircraft operation without permission of the Contracting Officer, unless the runway is-
 - (1) Closed by order of the Contracting Officer; and
 - (2) Marked as provided in paragraph 3.10.4 b. of this clause;
- d. Keep all paved surfaces, such as runways, taxiways, and hardstands, clean at all times and, specifically, free from small stones which might damage aircraft propellers or jet aircraft;
- e. Operate mobile equipment according to the safety provisions of this clause, while actually performing work on the airfield. At all other times, the Contractor shall remove all mobile equipment to locations-
 - (1) Approved by the Contracting Officer;
 - (2) At a distance of at least 750 feet from the runway centerline, plus any additional distance, and
 - (3) Necessary to ensure compliance with the other provisions of this clause; and
- f. Not open a trench unless material is on hand and ready for placing in the trench. As soon as practicable after material has been placed and work approved, the Contractor shall backfill and compact trenches as required by the contract. Meanwhile, all hazardous conditions shall be marked and lighted in accordance with the other provisions of this clause.

3.10.4 Landing Areas

The Contractor shall:

- a. Place nothing upon the landing areas without the authorization of the Contracting Officer;
- b. Outline those landing areas hazardous to aircraft, using (unless

otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated low-intensity red flasher lights by night;

c. Obtain, at an airfield where flying is controlled, additional permission from the control tower operator every time before entering any land area, unless the landing area is marked as hazardous in accordance with paragraph 3.10.4 b. of this clause;

d. Identify all vehicles it operates in landing areas by means of a flag on a staff attached to, and flying above, the vehicle. The flag shall be three feet square, and consist of a checkered pattern of international orange and white squares of 1 foot on each side (except that the flag may vary up to ten percent from each of these dimensions);

e. Mark all other equipment and materials in the landing areas, using the same marking devices as in paragraph 3.10.4 b. of this clause; and

f. Perform work so as to leave that portion of the landing area which is available to aircraft free from hazards, holes, piles of material, and projecting shoulders that might damage an airplane tire.

3.10.5 Safety Precaution Areas

The Contractor shall:

a. Place nothing upon the safety precaution areas without authorization of the Contracting Officer.

b. Mark all equipment and materials in safety precaution areas, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated, low-intensity red flasher lights by night.

c. Provide all objects placed in safety precaution areas with a red light or red lantern at night, if the objects project above the approach-departure clearance surface or above the transitional surface. (DFARS 252.236-7005)

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03/05

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(NORTH DAKOTA) NPDES PERMIT REQUIREMENTS
FOR STORM WATER
DISCHARGES FROM CONSTRUCTION SITES
03/05

Attachments: NDPDES Permit No. NDR11-0000
Notice of Intent
Notice of Termination
Construction Storm Water Pollution Prevention Plan
Guidance Forms
Site Inspection Record
Annual Location Record

These can be found at the following web site:
https://deq.nd.gov/WQ/2_NDPDES_Permits/7_Stormwater/StW.aspx

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor's NOI

Storm Water Pollution Prevention Plan; G-RO.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall be responsible for implementing the terms and requirements of the attached NDPDES Permit No. NDR10-0000 and the Storm Water Pollution Prevention Plan. The project is defined as a "Large Construction Activity" under the permit. The Government and the Contractor shall be considered co-permittees.

3.2 IMPLEMENTATION

3.2.1 Notice of Intent

The Contractor will complete and submit the Notice of Intent (NOI) in accordance with the NDPDES general permit. The Government will sign as the "Owner" and the Contractor will sign as the "Operator". For projects

defined under the permit as a "Large Construction Activity", the Contractor will complete and submit the Notice of Intent (NOI) in accordance with the NDPDES general permit. A copy of the Contractor's NOI shall be submitted at least 14 calendar days prior to beginning land disturbance activities.

3.2.2 Annual Location Record

The project be included the Contractor's Annual Location Record.

3.2.3 Storm Water Pollution Prevention Plan

The Contractor shall prepare, submit and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the NDPDES general permit. Any temporary or permanent erosion and sedimentation control measures shown on the drawings shall be incorporated into the Contractor's SWPPP. A copy of the SWPPP shall be submitted for approval at least 14 calendar days prior to beginning land disturbance activities. A copy of the approved SWPPP shall be furnished to the Base Environmental Office. The Government and Contractor will both sign the SWPPP for large construction activities. For small construction activities, the Contractor shall the SWPPP. The Contractor shall be responsible for implementing, maintaining and updating the SWPPP during construction. The Contractor shall modify the SWPPP whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the water of the state, or if the SWPPP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity.

3.2.4 Inspections and Reporting

The Contractor shall be responsible for all inspections and reporting required under the NDPDES general permit. Copies of each Site Inspection Report Form shall be furnished to the COR and the Base Environmental Office within 2 days after the inspection.

3.2.5 Records Retention

The Contractor shall keep all records and information required by the NDPDES general permit for at least three years.

3.2.6 Notice of Termination

The Government will sign and submit the Notice of Termination (NOT) in accordance with the NDPDES general permit for projects defined under the permit as a "Large Construction Activity".

-- End of Section --

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SOURCES FOR REFERENCE PUBLICATIONS 02/19

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g., ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AACE INTERNATIONAL (AACE)
1265 Suncrest Towne Centre Drive
Morgantown, WV 26505-1876 USA
Ph: 304-296-8444
Fax: 304-291-5728
Internet: <https://web.aacei.org/>

ACOUSTICAL SOCIETY OF AMERICA (ASA)
1305 Walt Whitman Road, Suite 300
Melville, NY 11747-4300
Ph: 516-576-2360
Fax: 631-923-2875
E-mail: asa@acousticalsociety.org
Internet: <https://acousticalsociety.org/>

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC. (AIA/NAS)
1000 Wilson Blvd, Suite 1700
Arlington, VA 22209-3928
Ph: 703-358-1000
E-mail: aia@aia-aerospace.org
Internet: <https://www.aia-aerospace.org/>

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)
1600 Boston-Providence Hwy
Walpole, MA 02081
Ph: 1-866-956-5888
Fax: 1-866-956-5819
Internet: <https://www.airbarrier.org/>

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
2800 Shirlington Road, Suite 300

Arlington, VA 22206
Ph: 703-575-4477
Internet: <https://www.acca.org/>

AIR DUCT COUNCIL (ADC)
1901 N. Roselle Road, Suite 800
Schaumburg, IL 60195
Ph: 847-706-6750
Fax: 847-706-6751
E-mail: info@flexibleduct.org
Internet: <https://flexibleduct.org/>

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)
30 West University Drive
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
E-mail: communications@amca.org
Internet: <http://www.amca.org>

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 400
Arlington, VA 22201
Ph: 703-524-8800
Internet: <http://www.ahrinet.org>

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)
1200 G Street, NW, Suite 500
Washington, D.C. 20005
Ph: 202-628-6380
E-mail: nbutler@atis.org
Internet: <http://www.atis.org>

ALUMINUM ASSOCIATION (AA)
1400 Crystal Drive
Suite 430
Arlington, VA 22202
Ph: 703-358-2960
E-Mail: info@aluminum.org
Internet: <https://www.aluminum.org/>

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1900 E Golf Rd, Suite 1250
Schaumburg, IL 60173
Ph: 847-303-5664
E-mail: customerservice@aamanet.org
Internet: <https://aamanet.org/>

AMERICAN ASSOCIATION OF RADON SCIENTISTS AND TECHNOLOGISTS (AARST)
475 South Church Street - Suite 600
Hendersonville, NC 28792
Ph: 800-269-4174
Fax: 828-214-6299
E-mail: info@aarst.org
Internet: <http://aarst-nrpp.com/wp/>

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)
444 North Capital Street, NW, Suite 249

Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aatcc.org
Internet: <https://www.transportation.org/>

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
1 Davis Drive
P.O. Box 12215
Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933
Internet: <https://www.aatcc.org/>

AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)
330 N. Wabash Ave., Suite 2000
Chicago, IL 60611
Ph: 202-367-1155
E-mail: info@americanbearings.org
Internet: <https://www.americanbearings.org/>

AMERICAN BOILER MANUFACTURERS ASSOCIATION (ABMA/BOIL)
8221 Old Courthouse Road, Suite 380
Vienna, VA 22182
Ph: 703-356-7172
E-mail: info@abma.com
Internet: <https://www.abma.com/>

AMERICAN BUREAU OF SHIPPING (ABS)
ABS Plaza
1701 City Plaza Drive
Spring, TX 77389 United States
Ph: 281-877-6000
Fax: 281-877-5976
E-Mail: ABS-WorldHQ@eagle.org
Internet: <https://ww2.eagle.org/>

AMERICAN COLLEGE OF RADIOLOGY (ACR)
1891 Preston White Dr.
Reston, VA 20191
Ph: 703-648-8900
E-mail: info@acr.org
Internet: <https://www.acr.org/>

AMERICAN COMPOSITES MANUFACTURER'S ASSOCIATION (ACMA)
2000 N. 15th St, Suite 250
Arlington, VA 22201
Ph: 703-525-0511
Fax: 703-525-0743
Internet: <https://acmanet.org>

AMERICAN CONCRETE INSTITUTE (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3700
Fax: 248-848-3701
Internet: <https://www.concrete.org/>

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
8445 Freeport Parkway, Suite 350
Irving, TX 75063-2595
Ph: 972-506-7216
Fax: 972-506-7682
E-mail: info@concrete-pipe.org
Internet: <https://www.concretepipe.org/>

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Ph: 513-742-2020
Fax: 513-742-3355
Internet: <https://www.acgih.org/>

AMERICAN FOREST FOUNDATION (AFF)
American Tree Farm System
2000 M Street, NW, Suite 550
Washington, DC 20036
Ph: 202-765-3660
Fax: 202-827-7924
Email: info@forestfoundation.org
Internet: <https://www.treefarmssystem.org>

AMERICAN FOREST AND PAPER ASSOCIATION (AF&PA)
American Wood Council
Public Policy Office
1101 K Street NW, Suite 700
Washington, DC 20005
Ph: 800-890-7732 or 202-463-2766
Fax: 412-741-0609
E-mail: publications@awc.org
Internet: <https://www.awc.org/>

AMERICAN GAS ASSOCIATION (AGA)
400 North Capitol Street, NW
Suite 450
Washington, D.C. 20001
Ph: 202-824-7000
Internet: <https://www.aga.org/>

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)
1001 N. Fairfax Street, Suite 500
Alexandria, VA 22314-1587
Ph: 703-684-0211
Fax: 703-684-0242
E-mail: tech@agma.org
Internet: <https://www.agma.org/>

AMERICAN HARDBOARD ASSOCIATION (AHA)
1210 West Northwest Highway
Palatine, IL 60067
Ph: 847-934-8800
Fax: 847-934-8803
E-mail: aha@hardboard.org
Internet: <http://domensino.com/AHA/>

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)
3141 Fairview Park Dr, Suite 777

Falls Church, VA 22042
Tel: 703-849-8888
Fax: 703-207-3561
E-mail: infonet@aiha.org
Internet: <https://www.aiha.org/>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
130 East Randolph, Suite 2000
Chicago, IL 60601
Ph: 312-670-5444
Fax: 312-670-5403
Steel Solutions Center: 866-275-2472
E-mail: solutions@aisc.org
Internet: <https://www.aisc.org/>

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 South Revere Parkway, Suite 140
Centennial, CO 80112
Ph: 503-639-0651
Fax: 503-684-8928
E-mail: mschoen@wclib.org
Internet: <http://www.aitc-glulam.org>

AMERICAN IRON AND STEEL INSTITUTE (AISI)
25 Massachusetts Avenue, NW Suite 800
Washington, DC 20001
Ph: 202-452-7100
Internet: <https://www.steel.org/>

AMERICAN LADDER INSTITUTE (ALI)
330 N. Wabash, Suite 2000
Chicago, IL 60611
Ph: 312-321-6806
Fax: 312-673-6929
E-mail: info@americanladderinstitute.org
Internet: <https://www.americanladderinstitute.org>

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)
7470 New Technology Way, Suite F
Frederick, MD 21703
Ph: 301-972-1700
Fax: 301-540-8004
E-mail: alsc@alsc.org
Internet: <http://www.alsc.org>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1899 L Street, NW, 11th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: storemanager@ansi.org
Internet: <https://www.ansi.org/>

AMERICAN PETROLEUM INSTITUTE (API)
1220 L Street, NW
Washington, DC 20005-4070
Ph: 202-682-8000
Internet: <https://www.api.org/>

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)
4501 Forbes Blvd., Suite 130
Lanham, MD 20706
Ph: 301-459-3200
E-mail: info@arema.org
Internet: <https://www.arema.org>

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
P.O. Box 28518
1711 Arlingate Lane
Columbus, OH 43228-0518
Ph: 800-222-2768 or 614-274-6003
Fax: 614-274-6899
E-mail: tjones@asnt.org
Internet: <https://www.asnt.org/>

AMERICAN SOCIETY FOR QUALITY (ASQ)
600 North Plankinton Avenue
Milwaukee, WI 53203
-or-
P.O. Box 3005
Milwaukee, WI 53201-3005
Ph: 800-248-1946; 414-272-8575
Fax: 414-272-1734
E-mail: help@asq.org
Internet: <https://asq.org/>

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191
Ph: 800-548-2723; 703-295-6300
Internet: <https://www.asce.org/>

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329
Ph: 404-636-8400 or 800-527-4723
Fax: 404-321-5478
E-mail: ashrae@ashrae.org
Internet: <https://www.ashrae.org/>

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Two Park Avenue
New York, NY 10016-5990
Ph: 800-843-2763
Fax: 973-882-1717
E-mail: customercare@asme.org
Internet: <https://www.asme.org/>

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)
520 N. Northwest Highway
Park Ridge, IL 60068
Ph: 847-699-2929
E-mail: customerservice@assp.org
Internet: <https://www.assp.org/>

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
18927 Hickory Creek Drive, Suite 220
Mokena, IL 60448
Ph: 708-995-3019
Fax: 708-479-6139
Internet: <http://www.asse-plumbing.org>

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 W. Quincy Avenue
Denver, CO 80235 USA
Ph: 303-794-7711 or 800-926-7337
Fax: 303-347-0804
Internet: <https://www.awwa.org/>

AMERICAN WELDING SOCIETY (AWS)
8669 NW 36 Street, #130
Miami, FL 33166-6672
Ph: 800-443-9353
Internet: <https://www.aws.org/>

AMERICAN WIND ENERGY ASSOCIATION (AWEA)
1501 M St. NW, Suite 900
Washington, DC 20005
Ph: 202-383-2500
Internet: <https://www.awea.org/>

AMERICAN WOOD COUNCIL (AWC)
222 Catoctin Circle SE, Suite 201
Leesburg, VA 20175
Ph: 800-890-7732
Fax: 412-741-0609
E-mail: publications@awc.org
Internet: <https://www.awc.org/>

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)
P.O. Box 361784
Birmingham, AL 35236-1784
Ph: 205-733-4077
Fax: 205-733-4075
Internet: <http://www.awpa.com>

AmericanHort (AH)
2130 Stella Court
Columbus, OH 43215
Ph: 614-487-1117 OH
Ph: 202-789-2900 DC
Internet: <https://www.americanhort.org/>

APA - THE ENGINEERED WOOD ASSOCIATION (APA)
7011 South 19th St.
Tacoma, WA 98466-5333
Ph: 253-565-6600
Fax: 253-565-7265
Internet: <https://www.apawood.org/>

ARCHITECTURAL WOODWORK INSTITUTE (AWI)
46179 Westlake Drive, Suite 120
Potomac Falls, VA 20165
Ph: 571-323-3636

Fax: 571-323-3630
E-mail: info@awinet.org
Internet: <http://www.awinet.org>

ARCNET TRADE ASSOCIATION (ATA)
E-mail: info@arcnet.com
Internet: <http://www.arcnet.com/index.htm></URL

ASM INTERNATIONAL (ASM)
9639 Kinsman Road
Materials Park, OH 44073-0002
Ph: 440-338-5151 (US), 440-462-0292 (International)
E-mail: memberservicecenter@asminternational.org
Internet: <https://www.asminternational.org/>

ASPHALT INSTITUTE (AI)
2696 Research Park Drive
Lexington, KY 40511-8480
Ph: 859-288-4960
Fax: 859-288-4999
E-mail: info@asphaltinstitute.org
Internet: <http://www.asphaltinstitute.org>

ASPHALT RECYCLING AND RECLAIMING ASSOCIATION (ARRA)
800 Roosevelt Road, Building C-312
Glen Ellyn, IL 60137
Ph: 630-942-6578
E-mail: annew@cmservices.com
Internet: <https://www.arra.org/>

ASPHALT ROOFING MANUFACTURER'S ASSOCIATION (ARMA)
750 National Press Building
529 14th Street, NW
Washington, DC 20045
Ph: 202-591-2450
Fax: 202-591-2445
Internet: <https://asphaltroofing.org/>

ASSOCIATED AIR BALANCE COUNCIL (AABC)
1220 19th St NW, Suite 410
Washington, DC 20036
Ph: 202-737-0202
Fax: 202-315-0285
E-mail: info@aabc.com
Internet: <https://www.aabc.com/>

ASSOCIATION FOR IRON AND STEEL TECHNOLOGY (AIST)
186 Thorn Hill Road
Warrendale, PA 15086
Ph: 724-814-3000
Fax: 724-814-3001
E-Mail: memberservices@aist.org
Internet: <https://www.aist.org/publications-advertising>

ASSOCIATION FOR THE ADVANCEMENT OF MEDICAL INSTRUMENTATION (AAMI)
901 N. Glebe Road, Suite 300
Arlington, VA 22203
Ph: 703-525-4890
Fax: 703-276-0793

E-mail: customerservice@aami.org
Internet: <http://www.aami.org>

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291
Ph: 205-257-3839
Fax: 205-257-2540
Internet: <https://aeic.org/>

ASSOCIATION OF HOME APPLIANCE MANUFACTURERS (AHAM)
1111 19th Street NW, Suite 402
Washington, DC 20036
Ph: 202-872-5955
E-mail: info@aham.org
Internet: <http://www.aham.org>

ASSOCIATION OF POOL & SPA PROFESSIONALS (APSP)
2111 Eisenhower Avenue, Suite 500
Alexandria, VA 22314-4679
Ph: 703-838-0083
Fax: 703-549-0493
E-mail: memberservices@apsp.org
Internet: <https://apsp.org/>

ASSOCIATION OF THE WALL AND CEILING INDUSTRY (AWCI)
513 West Broad Street, Suite 210
Falls Church, VA 22046
Ph: 703-538-1600
Fax: 703-534-8307
Internet: <https://www.awci.org/>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <https://www.astm.org/>

BACNET INTERNATIONAL (BTL)
BACnet Testing Laboratories
1827 Powers Ferry Road
Building 14, Suite 100
Atlanta, GA 30339
Ph: 770-971-6003
Fax: 678-229-2777
E-mail: info@bacnetinternational.org
Internet: <https://www.bacnetlabs.org/>

BAY AREA AIR QUALITY MANAGEMENT DISTRICT (BAAQMD)
375 Beale Street, Suite 600
San Francisco, CA 94105
Ph: 415-749-4900
Fax: 415-928-8560
Internet: <http://www.baaqmd.gov/>

BIFMA INTERNATIONAL (BIFMA)
678 Front Ave. NW, Suite 150
Grand Rapids, MI 49504-5368
Ph: 616-285-3963
E-mail: email@bifma.org
Internet: <https://www.bifma.org/>

BIOCYCLE, JOURNAL OF COMPOSTING AND RECYCLING (BIOCYCLE)
Ph: 610-967-4135
Internet: <https://www.biocycle.net/>

BRITISH STANDARDS INSTITUTE (BSI)
Ph: +44 345-086-9001
E-mail: cservices@bsigroup.com
Internet: <https://www.bsigroup.com/>

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)
355 Lexington Avenue, 15th Floor
New York, NY 10017
Ph: 212-297-2122
Fax: 212-370-9047
Internet: <https://www.buildershardware.com/>

CALIFORNIA AIR RESOURCES BOARD (CARB)
1001 I Street
Sacramento, CA 95814
Ph: 800-242-4450
Email: helpline@arb.ca.gov
Internet: <https://ww2.arb.ca.gov/>

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)
PO Box 997377, MS 0500
Sacramento, CA 95899-7377
Ph: 916-558-1784
Internet: <https://www.cdph.ca.gov/>

CALIFORNIA ENERGY COMMISSION (CEC)
Media and Public Communications Office
1516 Ninth Street, MS-29
Sacramento, CA 95814-5512
Ph: 916-654-5106
E-mail: appliances@energy.ca.gov
Internet: <https://www.energy.ca.gov/>

CARPET AND RUG INSTITUTE (CRI)
P.O. Box 2048
Dalton, GA 30722-2048
Ph: 706-278-3176
Fax: 706-278-8835
Internet: <https://carpet-rug.org/>

CAST IRON SOIL PIPE INSTITUTE (CISPI)
2401 Fieldcrest Drive
Mundelein, IL 60060
Ph: 224-864-2910
Internet: <https://www.cispi.org/>

CEILINGS AND INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)
1010 Jorie Blvd, Suite 30
Oak Brook, IL 60523
Ph: 630-584-1919
Fax: 866-560-8537
E-mail: cisca@cisca.org
Internet: <https://www.cisca.org>

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)
1600 Clifton Road
Atlanta, GA 30329-4027
Ph: 800-232-4636
TTY: 888-232-6348
Internet: <https://www.cdc.gov>

CHEMICAL FABRICS AND FILM ASSOCIATION (CFFA)
1300 Sumner Avenue
Cleveland OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: cffa@chemicalfabricsandfilm.com
Internet: <https://www.chemicalfabricsandfilm.com/>

CHLORINE INSTITUTE (CI)
1300 Wilson Boulevard, Suite 525
Arlington, VA 22209
Ph: 703-894-4140
Fax: 703-894-4130
E-mail: pubs@cl2.com
Internet: <https://www.chlorineinstitute.org>

COMPOSITE PANEL ASSOCIATION (CPA)
19465 Deerfield Avenue, Suite 306
Leesburg, VA 20176
Ph: 703-724-1128
Fax: 703-724-1588
Internet: <https://www.compositepanel.org/>

COMPRESSED AIR AND GAS INSTITUTE (CAGI)
1300 Sumner Avenue
Cleveland OH 44115
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: cagi@cagi.org
Internet: <https://www.cagi.org/>

COMPRESSED GAS ASSOCIATION (CGA)
14501 George Carter Way, Suite 103
Chantilly, VA 20151-1788
Ph: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com
Internet: <https://www.cganet.com/>

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
933 North Plum Grove Road
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PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

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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

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-12 (2006; Change 1) Engineering and Design -- Quality Management

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 Pricing Schedule item.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classifications; submittals not having a "G" classification are for information only. When used, a code following the "G" classifications 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, RO

Additional Requirements for Design Quality Control (DQC) Plan; G, RO

SD-05 Design Data

Discipline-Specific Checklists

Design Quality Control

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 design and construction operations, both onsite and offsite, and must 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 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 must maintain 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 10 calendar days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of FAR 52.246-12 "Inspection of Construction." The Government will consider an interim plan for the first 30 days of operation. Design and 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 design and construction operations, both onsite and offsite, including work by subcontractors, designers of record, consultants, architect/engineers (AE), 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.
- 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, designers of record, consultants, architect engineers (AE), 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 design and 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. 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 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 Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

- a. Submit and maintain a Design Quality Control (DQC) Plan as an effective quality control 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.

- b. 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. ER 1110-1-12 provides some useful information in developing checklists.
- c. Implement the DQC Plan by a Design Quality Control 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 registered professional engineer or architect. Notify the Contracting Officer, in writing, of the name of the individual, and the name of an alternate person assigned to the position.
- (1) The DQC Manager is responsible for reporting to the overall Project Manager of the Contractor for the design-build contract. The Project Manager will be held responsible for the quality of design on the contract and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract.

The Contracting Officer will notify the Contractor in writing of the acceptance of the DQC Plan. After acceptance, any changes proposed by the Contractor are subject to the acceptance of the Contracting Officer.

3.2.3 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 Contractor Quality Control (CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 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 Postaward Conference, before start of design or 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 10 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, design activities, 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, a Design Quality 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. Include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly 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 to maintain 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 Assignment of CQC System Manager, Project Superintendent, and SSHO Responsibilities

The CQC System Manager, Project Superintendent, and SSHO may not share duties and are required to be separate individuals.

3.4.4 Construction Quality Management Course

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.

Contractor personnel who otherwise fulfill all requirements for designation as a CQC Manager, but have not had the opportunity to obtain a CQM certificate due to COVID-19 restrictions, shall be permitted to serve as Quality Control Managers conditioned upon obtaining a CQM-C certificate within 120 days of USACE lifting current in person learning restrictions.

CQC Managers who were in possession of valid CQM certificate (i.e. not delinquent on the 5 year course renewal requirement) as of 01-Mar-2020 will have a grace period for obtaining the CQM renewal training of 6-months from the lifting of COVID-19 restrictions and USACE being able to provide face to face CQM training.

This course is periodically offered at offices indicated at the following web site:

<http://www.nwo.usace.army.mil/BusinessWithUs/Contracting/QualityManagement.aspx>

The exact date and location for the sessions will be determined approximately 30 calendar days in advance by the trainer (POC). Cost varies by location per student.

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.

The Government reserves the right to recognize certificates issued as a result of virtual training by a certified instructor as valid.

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 00.15 10 TOTAL BUILDING COMMISSIONING are included in the contract, the submittals required by those sections 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.

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 48 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.

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.

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 form can be found at:

<https://mtc.erdcdren.mil/>

Click on "Lab Validation"
Search for a Validation

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 the actual cost for the 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.

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. Make a second inspection by 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.

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 with FAR 52.246-12 "Inspection of Construction".

3.9 DOCUMENTATION

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. Include information identified by the "Responsible Individual(s)" for Safety as outlined in Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of

the Independent Technical Review (ITR) team, the ITR review comments, responses and the record of resolution of the comments.

k. 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 Contracting Officer's Representative on the first day following the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. The Government may elect to process these records electronically. Coordinate with the Contracting Officer's Representative. 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

Generate daily quality control reports using the Government-furnished Construction Contractor Module of RMS specified in Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE(RMS CM).

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 --

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CONTRACTORS QUALITY CONTROL REPORT (QCR) DAILY LOG OF CONSTRUCTION - MILITARY		REPORT NUMBER 218		Page 1 of 1
		DATE 09 Dec 2004 - Thursday		
PROJECT D/B Main Fire Station		CONTRACT NUMBER W9128F-04-C-0013 NA		
CONTRACTOR Bryan Construction		WEATHER Weather Not Entered		
QC NARRATIVES No QC Narratives were reported today				
PREP/INITIAL DATES (Preparatory and initial dates held and advance notice) No preparatory or initial inspections were held today				
ACTIVITY START/FINISH No activities were started or finished today				
QC REQUIREMENTS No QC requirements were completed today				
QA/QC PUNCH LIST (Describe QC Punch List items issued, Report QC and QA Punch List items corrected) No QC Punch List items were issued today No Punch List items were corrected today				
CONTRACTORS ON SITE (Report first and/or last day contractors were on site) No contractors had their first or last day on site today				
LABOR HOURS No labor hours were Reported today Total hours worked to date: 0.0				
EQUIPMENT HOURS No equipment hours were Reported today Total operating hours to date: 0.0				
ACCIDENT REPORTING (Describe accidents) No accidents reported today				
CONTRACTOR CERTIFICATION On behalf of the contractor, I certify that this Report is complete and correct and all equipment and material used and work performed during this Reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.				
QC REPRESENTATIVE'S SIGNATURE		DATE	SUPERINTENDENT'S INITIALS	DATE

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11/16

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SECTION 01 45 00.15 10

RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
11/16

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 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-Price Construction Contracts; 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. The information shown on the submittal register following the specification

Section 01 33 00 SUBMITTAL PROCEDURES will already be entered into the RMS database when access is granted. 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 01.00 10 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 --

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SECTION 01 57 20.00 10

ENVIRONMENTAL PROTECTION
08/20

PART 1 GENERAL

Attachments:

Grand Forks AFB Recycling Opportunities for Industrial Facilities

Additional Recycling Opportunities

Grand Forks Technical Provisions Section 01000

NOTE: If the requirements in Specification Section 01 57 20.00 10 conflict with requirements in the attached section 01000, the requirements in Section 01 57 20.00 10 shall govern.

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. AIR FORCE (USAF)

AFI 32-1053 (1999) Pest Management Program

U.S. ARMY (DA)

DA AR 200-5 (1999) Pest Management

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

WETLAND MANUAL Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328 Definitions of Waters of the United States

40 CFR 150 - 189 Pesticide Programs

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 279 Standards for the Management of Used Oil

40 CFR 302 Designation, Reportable Quantities, and Notification

40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
49 CFR 171 - 178	Hazardous Materials Regulations

1.2 DEFINITIONS

1.2.1 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 and/or historically.

1.2.2 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.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means 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 etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

1.2.5 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor must discharge water at a rate which 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. Land Application must be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.6 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.7 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.8 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.9 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.10 Wetlands

Those areas that are inundated or saturated by surface or ground water 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. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLAND MANUAL.

1.3 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. Payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor, and payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations are the Contractor's responsibility. All costs associated with this section must be included in the contract price.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation 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

Environmental Protection Plan G, RO

The environmental protection plan.

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

Include in the environmental protection plan, but not limit it to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that

the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. Include in this plan, as a minimum:

- 1). The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify the Contracting Officer and the local Fire Department, Facility Environmental Office in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.

- 2). The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

- 3). Training requirements for Contractor's personnel and methods of accomplishing the training.

- 4). A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

- 5). The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

- 6). The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.

- 1). Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.

- 2). Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).

- 3). Indicate in the report the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

- 4). A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

m. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

n. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.

o. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan must include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan must include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan must include documentation that the Waste Water Treatment Plant Operator has approved the flow

rate, volume, and type of discharge.

p. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include in the plan methods to assure the protection of known or discovered resources, identifying lines of communication between Contractor personnel and the Contracting Officer.

q. Include and update a pesticide treatment plan, as information becomes available. Include in the plan: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation Project Office specific requirements are the Contractor's responsibility in conformance with DA AR 200-5 Pest Management, Chapter 2, Section III "Pest Management Records and Reports" AFI 32-1053 Sections 3.4.13 and 3.4.14 for data required to be reported to the Installation.

1.7.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including 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. This survey report will be signed by both the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.8.1 Applications, Supporting Documents, and Fees

The Contractor shall obtain and complete all environmental permit applications and notices including any documents required for a modification for an existing permit held by the Facility. The Contractor is responsible for preparing all supporting documents, including but not

limited to engineering reports, emission surveys, diagrams, pollutant load calculations, etc. If, in lieu of permits, the governing agency requires review and approval of the design, the Contractor shall submit and obtain approval of the design and associated documents. The Contractor shall be responsible for all fees associated with the permits, applications, reviews, approvals, and notices.

1.8.2 Environmental Permits, Notices, Reviews, and/or Approvals

The following is a listing of permits, notices, reviews, and/or approvals which **may be** required for this project. This listing and requirements are not to be considered all-inclusive by the Contractor, but is provided as information that may be used in successfully accomplishing the environmental compliances. See Internet site <http://http://www.health.state.nd.us/ndhd/for> North Dakota's Environmental Issues.

- a. The State of North Dakota has authority for the National Pollutant Discharge Elimination System (NPDES) program. If construction activities results in disturbance of 1 acre of land or more, coverage under the Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination System (NDPDES) Permit No. NDR11-0000 for storm water discharge from construction site is required. The Contractor shall be responsible for implementing the terms and requirements of the permit and shall be considered as a "co-permittee". The Government will sign as the "Owner" and the Contractor will sign as the "Operator". For projects defined under the permit as a "Large Construction Activity", the Contractor will complete and submit the Notice of Intent (NOI) in accordance with the NDPDES general permit. The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan, inspections, and reporting in accordance with the NDR11-0000 Permit. The SWPPP and a copy of an unsigned Notice of Intent (NOI) shall be submitted by the Contracting Officer prior to construction commencing. The Contractor shall be responsible for all submittals to the State of North Dakota prior to construction activity beginning in accordance with Permit No. NDR11-0000. The Contractor shall retain copies of the storm water pollution prevention plan and all reports in accordance with the permit. All submissions to the State shall be by certified mail or electronic. The Contractor shall include copies of all submittals to the State of North Dakota (NOI/NOT), a return certified mail receipt, plans, and reports in the Appendix to the Environmental Protection Plan. The State of North Dakota web site for the NPDES Program is <http://www.health.state.nd.us/wq/Storm/Construction/ConstructionHome.htm>.
- b. Drinking water, pumps, new water mains including fire hydrants, lawn sprinkler systems, back-flow preventers, stormwater and sanitary sewer approval of plans and specifications is required by the State of North Dakota prior to construction commencing. These plans and specifications shall be sent to the North Dakota Department of Health, Division of Municipal Facilities, ATTN: Gary Stefanovsky, 1200 Mission Avenue, Bismarck, North Dakota 58506-5520; for review and approval. The plans and specifications shall be submitted with a cover letter requesting a review and approval. The plans and specifications are required to have a stamp and signature of a registered engineer from the State of North Dakota. The State of North Dakota may take up to 30 days

for approval.

- c. Grand Forks AFB has a State of North Dakota Title V Air Permit for the entire facility. The Contractor shall coordinate all air pollutant emissions with Grand Fork's AFB Environmental Flight for possible modifications and/or permit to construct.
- d. The Asbestos NESHAP, 33-15-13-02 Code of the North Dakota Air Pollution Control Rules, requires written notification of demolition or renovation activities under Subsection 02.6 regardless of the presents of asbestos containing material. The Contractor (through the Contracting Officer) shall coordinate the written Notification of Demolition with Grand Fork's Environmental Flight a minimum of ten days prior to demolish/or renovation activities.
- e. Grand Forks Technical Provisions, Section 01000 is a Grand Forks specification that should be followed as much as possible. ***The Contractor needs to note that if the requirements in Specification Section 01 57 20.00 10 conflict with requirements in the attached section 01000, the requirements in Section 01 57 20.00 10 shall govern.***

1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings, plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.10 NOTIFICATION

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 Environmental Protection plan. After receipt of such notice, the Contractor will 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. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

Obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations is the Contractor's responsibility.

3.2 LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Identify any land resources to be preserved within the work area prior to the beginning of any construction. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval, except in areas indicated on the drawings or specified to be cleared. Ropes, cables, or guys will not be fastened to or attached to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times, as defined in the following subparagraphs. Remove stone, soil, or other materials displaced into uncleared areas.

3.2.1 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 which 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. The Contractor's personnel must be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved must be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

Providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations is the Contractor's responsibility. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices must also be in accordance with the North Dakota National Pollutant Discharge Elimination System (NPDES) Storm Water Pollution Prevention Plan (SWPPP) and NDR02-1314 Grand Forks AFB North Dakota Pollution Discharge Elimination System (NPDES) Industrial Storm Water Permit including Grand Forks AFB's Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Grand Forks AFB's Environmental Office. Remove any temporary measures after the area has been stabilized.

3.2.4 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. Temporary movement or relocation of Contractor facilities will be made only when approved. Erosion and sediment controls must be provided for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas must be controlled to protect adjacent areas.

3.3 WATER RESOURCES

Monitor all water areas affected by construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. For construction activities immediately adjacent to impaired surface waters, the Contractor must be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.4 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with all Federal and State air emission and performance laws and standards.

3.4.1 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. The Contractor shall comply with North Dakota Administration Code 33-15-17, Restriction of Fugitive Emissions. 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 which would cause the Federal, State, and local air pollution standards to be exceeded or which 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 at all times. 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 all State and local visibility regulations.

3.4.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.4.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of North Dakota's rules.

3.4.4 Burning

Burning is prohibited on the Government premises.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Handling, storage, and disposal must be conducted to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill will be the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

3.5.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the Government. Collect chemical waste in corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262 in accordance with the Installation hazardous waste management plan. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations is the Contractor's responsibility. Transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the Contracting Officer and the Facility Environmental Flight Office. Cleanup and cleanup costs due to spills are the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility. Grand Forks AFB (GFAFB) is a large quantity generator of hazardous waste. All hazardous waste generated on GFAFB shall be managed in accordance with Large Generator of Hazard Waste Standard as specified in 40 CFR 262. All hazardous waste generated on GFAFB shall be managed and coordinated with GFAFB 319 CES/CEVP, Environmental Flight, and the Contracting Officer. The Contractor shall:

a. Dispose of all hazardous waste through GFAFB 319 CES/CEVP, Environmental Flight in compliance with all Federal, State, and local laws and regulations unless the Contractor obtains a waiver from GFAFB 319 CES/CEVP, Environmental Flight, Installation Commander, HQ/ACC, HQ USAF/CEV, and the Contracting Officer to use another hazardous waste hauler or disposal company. All waiver requests shall be coordinated through the Contracting Officer.

b. Comply with all applicable requirements in the 319 ARW 7042-97 Hazardous Waste Management Plan, HWPM, that may be reviewed at the GFAFB Environmental Flight. The HWPM covers the procedures that the Contractor shall follow to accumulate, store, and turn-in hazardous waste on GFAFB.

c. Notify GFAFB 319 CES/CEVP, Environmental Flight of all hazardous waste accumulation to arrange for periodic inspection.

d. Use new/unused performance oriented tested containers that are marked with appropriate information showing conformance to the United Nations (UN) Standard.

e. Accumulated no more than 55 gallons of any one hazardous waste stream at a time. Once the 55 gallon limit has been reached, the container shall be labeled with the date that the container was filled and shall be labeled with the contents of the container. The container shall be transported to a 90-day accumulation site within three days of the date the container was filled.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site is not allowed. Fuel must be brought to the project site each day that work is performed.

3.5.5 Waste Water

Disposal of waste water will be as specified below.

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed 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 all Federal, State, Regional and Local laws and regulations.

b. For discharge of ground water, the Contractor shall obtain coverage under the State of North Dakota's General Permit specific for pumping and dewatering activities prior to surface discharging. The Contractor shall be responsible for assuring that all discharge of water shall be in accordance with all Federal, State, Regional and local laws and regulations.

- c. For water generated from the disinfection and hydrostatic testing of the domestic water and sewer lines including firewater lines, the Contractor shall discharge the waste water into the sanitary sewer with prior approval and/or notification to the Waste Water Treatment Plant's Operator.
- d. For water generated from hydrostatic testing the new above and under ground storage tanks, the Contractor shall obtain coverage under the State of North Dakota Hydrostatic Testing General permit and shall discharge the water in accordance with all Federal, State, and local laws and regulations.

3.6 RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is encouraged to minimize solid waste generation throughout the duration of the project. The Contractor shall contact GFAFB 319 CES/CEV Environmental Flight for the current recycling and waste minimization requirements for the base. See attached RECYCLING OPPORTUNITIES FOR INDUSTRIAL FACILITIES and ADDITIONAL RECYCLING OPPORTUNITIES for current instructions and recycling opportunities available on GFAFB.

3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

Maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to Grand Forks AFB Environmental Flight through the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. Include the following in the report:

- a. Construction and Demolition (C&D) Debris Disposed = _____ in cubic yards or tons, as appropriate.
- b. Construction and Demolition (C&D) Debris Recycled = _____ in cubic yards or tons, as appropriate.
- c. Total C&D Debris Generated = _____ in cubic yards or tons, as appropriate.
- d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = _____ in cubic yards or tons, as appropriate.

3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources will be temporarily 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.

3.9 BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The protection of threatened and endangered animal and plant species, including their habitat, is the Contractor's responsibility in accordance with Federal, State, Regional, and local laws and regulations.

3.10 INTEGRATED PEST MANAGEMENT

In order to minimize impacts to existing fauna and flora, the Contractor through the Contracting Officer, must coordinate with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application. Discuss integrated pest management strategies with the IPMC and receive concurrence from the IPMC through the COR prior to the application of any pesticide associated with these specifications. Installation Project Office Pest Management personnel will be given the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 150 - 189.

3.10.1 Pesticide Delivery and Storage

Deliver pesticides to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. Store pesticides according to manufacturer's instructions and under lock and key when unattended.

3.10.2 Qualifications

For the application of pesticides, use the services of a subcontractor whose principal business is pest control. The subcontractor must be licensed and certified in the state where the work is to be performed.

3.10.3 Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Furnish Material Safety Data Sheets (MSDS) for all pesticide products.

3.10.4 Application

Apply pesticides using a State Certified Pesticide Applicator in accordance with EPA label restrictions and recommendation. The Certified Applicator must wear clothing and personal protective equipment as specified on the pesticide label. The Contracting Officer will designate locations for water used in formulating. Do not allow the equipment to overflow. All equipment must be inspected for leaks, clogging, wear, or damage and repaired prior to application of pesticide.

3.11 PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto

the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.12 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.13 MILITARY MUNITIONS

In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, the Contractor will immediately stop work in that area and immediately inform the Contracting Officer.

3.14 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all personnel prior to commencing construction activities. Additional meetings must be conducted 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; installation 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, wetlands, and endangered species and their habitat that are known to be in the area.

3.15 POST CONSTRUCTION CLEANUP

The Contractor will clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, obliterate all signs 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. The disturbed area must be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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02/22

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SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL
02/22

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 in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D448 (2012; R 2017) Standard Classification for Sizes of Aggregate for Road and Bridge Construction

ASTM D4873/D4873M (2017) Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 288 (2021) Standard Specification for Geosynthetic Specification for Highway Applications

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA FP-14 (2014) FP-14 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects

1.2 GENERAL

Implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit specified in Section 01 41 26.06 24 NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES. Install and maintain stabilization and structural best management practices which will minimize erosion and sediment pollution from the construction site to the extent attainable. Maintain responsibility for selection of appropriate best management practices as specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described in the Storm Water Pollution Prevention Plans (SWPPP) per Section 01 41 26.06 24 NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES.

1.4.1 Stabilization Practices

The stabilization practices to be implemented may include temporary seeding, mulching, sod stabilization, vegetative buffer strips, erosion control blankets, protection of trees, preservation of mature vegetation, etc. Record the dates when the major grading activities occur on the daily CQC report; when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

1.4.1.1 Permanent Seeding

Stabilize disturbed areas of the site where construction activities permanently cease with permanent seeding no more than 14 days after the construction activity ceases, except as follows. When the initiation of permanent seeding is stopped due to snow cover or arid conditions, initiate permanent seeding as soon as practicable.

1.4.1.2 Temporary Seeding and Mulching

Temporarily seed and mulch areas where construction activities will temporarily cease for more than one year. Stabilize disturbed areas of the site where construction activities temporarily cease for more than 21 days and less than one year with either temporary seeding and mulching or mulching not more than 14 days after construction activity ceases, except as follows. When the initiation of temporary stabilization measures is stopped due to snow cover or arid conditions, initiate stabilization measures as soon as practicable.

1.4.1.3 Erosion Control Blankets

Erosion control blanket may be installed on steep slopes and in drainage swales and ditches to protect finished grades from erosion.

1.4.2 Temporary Structural Practices

Implement temporary structural 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 to the degree attainable. Implement temporary structural practices in a timely manner during the construction process to minimize erosion and sediment runoff. Temporary structural practices shall include but not be limited to the following devices.

1.4.2.1 Silt Fences

Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain

sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fence barriers along the down slope boundary of all disturbed areas prior to beginning land-disturbing activities in those areas. Silt fence barriers may be installed across ditches or swales but not where the drainage area is greater than 1 acre. Removal of silt fence barriers shall be approved by the Contracting Officer.

1.4.2.2 Storm Drain Inlet Protection

Install storm drain inlet protection at each new and existing inlet which receives storm runoff from disturbed areas of 1 acre or less. Remove the protection at each inlet once the disturbed area has been finally stabilized.

1.4.2.3 Culvert Inlet Protection

Install culvert inlet protection at all culverts with a drainage area of 1 acre or less.

1.4.2.4 Rock Check Dams

Rock check dams may be used to reduce erosion of temporary or permanent ditches or swales. Use type 1 rock check dams when the upstream drainage area is less than 2 acres. Use type 2 rock check dams when the upstream area is 2 to 10 acres.

1.4.2.5 Stone Construction Entrance

Construct a stone construction entrance wherever traffic will be leaving the construction site and move directly onto a paved road. Remove stone construction entrances after the site has been finally stabilized.

1.4.2.6 Sediment Trap

Sediment traps may be constructed below disturbed areas where the total contributing drainage area is less than 3 acres. Sediment traps, when used, should be constructed prior to disturbance of upslope areas. Sediment traps must have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half shall be in the form of a drawdown or dry storage which will provide extended settling time during less frequent, larger storm events.

1.4.2.7 Diversion Dikes

Diversion dikes may be constructed to divert runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet or to divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin. Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Geotextile

The geotextile shall comply with the requirements of AASHTO M 288 for temporary silt fence.

2.1.2 Silt Fence Stakes and Posts

Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the geotextile and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile.

2.1.4 Identification Storage and Handling

Geotextile shall be identified, stored and handled in accordance with ASTM D4873/D4873M.

2.1.5 Support Mesh

Support mesh shall be 14-1/2 gage or heavier steel wire with a mesh spacing of 6 by 6 inch or a prefabricated polymeric mesh of equivalent strength.

2.2 Erosion Control Blankets

Installation staple patterns shall be clearly marked on the erosion control blanket with environmentally safe paint.

2.2.1 Netless Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd). The blanket shall have a 12-month typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:4H and channels with shear stresses up to 0.50 pounds per square foot.

2.2.2 Single-Net Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd) and photodegradable netting on the top side. The blanket shall be sewn together with degradable thread. The blanket shall have a 12-month

typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:3H and channels with shear stresses up to 1.50 pounds per square foot.

2.2.3 Double-Net Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd) and photodegradable netting on each side. The blanket shall be sewn together with degradable thread. The blanket shall have a 12-month typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:2H and channels with shear stresses up to 1.75 pounds per square foot.

2.3 Permanent Turf Reinforcement Mat

Turf reinforcement matting shall conform to FHWA FP-14, Section 713, Type 5.A.

2.4 COMPONENTS FOR SEDIMENT TRAP

Coarse aggregate shall conform to ASTM D448, Size 3, 357, or 5. Minor variations from the gradations specified will be permitted. Stone for riprap shall consist of field stone or rough unhewn quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering. The specific gravity of individual stones shall be at least 2.5. Riprap stones shall weigh between 50 and 150 pounds each, except that approximately 10 percent may weigh 50 pounds or less. At least 60 percent shall weight more than 100 pounds. Geotextile shall conform to paragraph GEOTEXTILES.

2.5 COMPONENTS FOR INLET PROTECTION

Aggregates for gravel filter should be sized to get the greatest amount of filtering action possible (by using smaller-sized stone), while not creating significant ponding problems.

2.6 STONE CONSTRUCTION ENTRANCE

Aggregate for construction entrance shall conform to ASTM D448, Size 1. Minor variations from the gradation specified will be permitted. Geotextile shall conform to paragraph GEOTEXTILES.

2.7 ROCK CHECK DAMS

Coarse aggregate shall conform to ASTM D448 size number 1 or approved equal. Riprap shall consist of field stone or rough unhewn quarry stone of approximately rectangular shape. Riprap shall be hard and angular. The specific gravity of individual stones shall be at least 2.5. Concrete rubble may be used provided it has a density of at least 150 pcf. Individual stones shall have a weight of 50 to 150 lbs except that a maximum of 10 percent of stone may weigh less than 50 lbs. At least 60 percent of stones shall weigh more than 100 lbs.

2.8 GEOTEXTILES

Geotextile for other than silt fence shall comply with the requirements of AASHTO M 288 for a separation geotextile.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Geotextile shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, geotextile shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. Silt fence may be installed using either the trench or soil slicing method. Silt fences shall be removed upon approval by the Contracting Officer.

3.2 EROSION CONTROL BLANKETS

Installation of erosion control blankets shall conform to the manufacturer's recommendations.

3.3 TURF REINFORCEMENT MAT

Installation of turf reinforcement matting shall conform to the manufacturer's recommendations.

3.4 Sediment Trap

The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat. Fill material for the embankment shall be placed in accordance with Section 31 00 00 EARTHWORK. A geotextile shall be placed between the riprap and subgrade.

3.5 Stone Construction Entrance

The area of the entrance shall be cleared of all vegetation, roots, and other objectionable material. The aggregate layer shall have a minimum total thickness of 6 inches. A geotextile shall be placed beneath aggregate for the full width and length of the entrance. A minimum of 3 inches of the aggregate shall be placed in a cut section to provide stability and secure the geotextile. If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the stone, then the tires of the vehicles shall be washed before entering the road. Wash water must be carried away from the entrance to an approved settling area to remove sediment. A wash rack may also be installed for washing of vehicles.

3.6 MAINTENANCE

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Maintenance of protective measures shall conform to the requirements in the SWPPP.

3.6.1 Silt Fences

Inspect silt fences in accordance with paragraph INSPECTIONS. Make any required repairs promptly. Pay close attention to the repair of damaged

silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove silt fence when it is no longer required. Shape the immediate area occupied by the fence and any sediment deposits to an acceptable grade. Seed the areas disturbed by this shaping in accordance with Section 32 92 19 SEEDING.

3.6.2 Storm Drain Inlet Protection

Inspect inlet protection structures after each rainfall and make repairs as needed. Remove sediment and restore the trap to its original dimensions when the sediment has accumulated to one half the design depth.

3.6.3 Rock Check Dams

Check dams should be checked for sediment after each runoff-producing storm event. Remove sediment when it reaches one half the original height of the measure.

3.6.4 Stone Construction Entrance

Maintain stone construction entrances in a condition which will prevent tracking or flow of mud onto paved roads. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

3.6.5 Sediment Traps

Remove sediment restore the trap to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Check filter stone regularly to ensure that filtration performance is maintained. Remove stone choked with sediment and clean or replace. Inspect the structure regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. Inspect the height of the stone outlet to ensure that its center is at least 1 foot below the top of the embankment.

3.6.6 Diversion Dikes

Inspect diversion dikes in accordance with paragraph INSPECTIONS. Pay close attention to the repair of damaged diversion dikes and promptly accomplish necessary repairs. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. Seed the areas disturbed by this shaping in accordance with Section 32 92 19 SEEDING.

3.7 INSPECTIONS

3.7.1 General

Inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally

stabilized, conduct such inspection at least once every month. Inspection of protective measures shall conform to the requirements in the SWPPP.

3.7.2 Inspections Details

Inspect disturbed areas and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.7.3 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention measures, maintenance performed, and actions taken. Furnish the report to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT.

-- End of Section --

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SECTION 01 62 35

RECYCLED / RECOVERED MATERIALS

07/06

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PART 2 PRODUCTS

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-- End of Section Table of Contents --

SECTION 01 62 35

RECYCLED / RECOVERED MATERIALS

07/06

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 247 Comprehensive Procurement Guideline for
Products Containing Recovered Materials

1.2 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. Make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

02/19, CHG 3: 11/21

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
02/19, CHG 3: 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.

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 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 Quality Control Manager, as specified in Section 01 45 00.00 10 QUALITY CONTROL, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.4.3 Special Programs

Implement any 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 streams not listed:

- a. Land Clearing Debris
- b. Asphalt
- c. Masonry and CMU
- d. Concrete
- e. Metals (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze, etc.)
- 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" classification. Submittals not having a "G" 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, RO

SD-06 Test Reports

Quarterly Reports

Annual Report

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; G, RO

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 installation Hazardous Waste Program Manager and 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.

The requirements of this meeting may be fulfilled during the coordination and mutual Understanding meeting outlined in Section 01 45 00.00 10 QUALITY CONTROL. At a minimum, discuss and document waste management goals at following meetings:

- a. Preconstruction meeting.
- b. Regular Quality Control meetings.
- c. Work safety meeting (if applicable).

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

Submit Construction Waste Management Plan within 30 calendar days after notice to proceed. Revise and resubmit Construction Waste Management Plan until it receives final approval from the installation Hazardous Waste Program Manager and 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/or 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 any 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.
- 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.

Distribute copies of the waste management plan to each subcontractor, Quality Control 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 through re-use, recycling and/or sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for any 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 and installation POC during construction or incidental demolition activities. Provide a copy of the diversion records to the Contracting Officer and installation POC 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 and installation POC. 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 quantities 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. Submit Quarterly Reports to the appropriate office or identified point of contact.

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. Provide copy of annual construction waste diversion report to the installation POC.

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). The final Construction Waste Diversion Report must be included in the Sustainability eNotebook in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING.

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 other applicable contract requirements. 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, in compliance with paragraph 1.4 of this section, and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, recycle or 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. Consider the sale or donation of waste suitable for reuse.

Base CES will salvage the high-density storage and locks in the building. CES may also desire to salvage mechanical equipment. Coordinate timing of

CES's salvage operations by providing at least two weeks notice of when they can salvage 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.

1.12.3 HAZMART Disposal

Dispose of all fluorescent lamps, HID lamps, mercury (Hg) containing thermostats and ampoules through the HAZMART as a Universal Waste. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements. Dispose of PCBs containing ballasts and electrical components through the HAZMART. Properly collect and containerize in DOT-approved shipping containers, also approved by the HWMP, universal waste and PCBs. Properly label the containers in accordance with all federal regulations. Deliver all universal waste and PCBs requiring disposal to the HAZMART.

1.12.4 Waste

Dispose by landfill or incineration only those waste materials not listed above with no practical use, economic benefit, or recycling opportunity.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

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SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
07/06

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 E1971 (2005; R 2011) Standard Guide for
Stewardship for the Cleaning of Commercial
and Institutional Buildings

1.2 SUSTAINABILITY REQUIREMENTS

Materials in this technical specification may contribute towards contract compliance with sustainability requirements. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for project requirements.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

O&M Database; G, RO

Training Plan; G, RO

Training Outline; G, RO

Training Content; G, RO

SD-11 Closeout Submittals

Training Video Recording; G, RO

Validation of Training Completion; G, RO

1.4 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of Government personnel. Compile and prepare aggregate O&M data including clarifying

and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.4.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.4.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 4. Commissioned items with a Data Package 1 or 2 requirement shall use instead Data Package 3.

1.4.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.4.4 Review and Approval

The Contractor's Commissioning Authority (CA) shall review the commissioned systems and equipment submittals for completeness and applicability. The CA shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CA shall communicate deficiencies to the Contracting Officer. Upon a successful review of the corrections, the CA shall recommend approval and acceptance of these O&M manuals to the Contracting Officer. This work shall be in addition to the normal review procedures for O&M data.

1.4.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.5 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.5.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.5.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.5.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.5.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.5.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.5.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.5.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.5.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.5.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.5.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

- a. A table showing recommended lubricants for specific temperature ranges and applications.

- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

1.5.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.5.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.5.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.5.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.5.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.5.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.5.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.5.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.5.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.5.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.5.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.5.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.5.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.5.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system. Provide copies of warranties required by Section 01 78 36.00 24 WARRANTY OF CONSTRUCTION AND DESIGN.

1.5.5.6 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed,

indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide copies of warranties required by Section 01 78 36.00 24 WARRANTY OF CONSTRUCTION AND DESIGN.

1.5.5.7 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.5.5.8 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.5.5.9 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.5.5.10 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.6 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

- a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.
- b. Full as-built sequence of operations.
- c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).
- d. Full points list. A listing of rooms shall be provided with the following information for each room:
 - (1) Floor
 - (2) Room number
 - (3) Room name
 - (4) Air handler unit ID

- (5) Reference drawing number
- (6) Air terminal unit tag ID
- (7) Heating and/or cooling valve tag ID
- (8) Minimum cfm
- (9) Maximum cfm

1.7 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.7.1 Data Package 1

- a. Safety precautions
- b. Cleaning recommendations
- c. Maintenance and repair procedures
- d. Warranty information
- e. Contractor information
- f. Spare parts and supply list

1.7.2 Data Package 2

- a. Safety precautions
- b. Normal operations
- c. Environmental conditions
- d. Lubrication data
- e. Preventive maintenance plan and schedule
- f. Cleaning recommendations
- g. Maintenance and repair procedures
- h. Removal and replacement instructions
- i. Spare parts and supply list
- j. Parts identification
- k. Warranty information
- l. Contractor information

1.7.3 Data Package 3

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Environmental conditions
- g. Lubrication data
- h. Preventive maintenance plan and schedule
- i. Cleaning recommendations
- j. Troubleshooting guides and diagnostic techniques
- k. Wiring diagrams and control diagrams
- l. Maintenance and repair procedures
- m. Removal and replacement instructions
- n. Spare parts and supply list
- o. Product submittal data
- p. O&M submittal data
- q. Parts identification
- r. Warranty information
- s. Testing equipment and special tool information
- t. Testing and performance data
- u. Contractor information

1.7.4 Data Package 4

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions

- h. Lubrication data
- i. Preventive maintenance plan and schedule
- j. Cleaning recommendations
- k. Troubleshooting guides and diagnostic techniques
- l. Wiring diagrams and control diagrams
- m. Maintenance and repair procedures
- n. Removal and replacement instructions
- o. Spare parts and supply list
- p. Corrective maintenance man-hours
- q. Product submittal data
- r. O&M submittal data
- s. Parts identification
- t. Warranty information
- u. Personnel training requirements
- v. Testing equipment and special tool information
- w. Testing and performance data
- x. Contractor information

1.7.5 Data Package 5

- a. Safety precautions
- b. Operator prestart
- c. Start-up, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Environmental conditions
- f. Preventive maintenance plan and schedule
- g. Troubleshooting guides and diagnostic techniques
- h. Wiring and control diagrams
- i. Maintenance and repair procedures
- j. Removal and replacement instructions
- k. Spare parts and supply list

- l. Product submittal data
- m. Manufacturer's instructions
- n. O&M submittal data
- o. Parts identification
- p. Testing equipment and special tool information
- q. Warranty information
- r. Testing and performance data
- s. Contractor information

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the Facility Data Workbook and Facility Document Set as defined in 01 78 24.00 10 FACILITY DATA REQUIREMENTS. Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

- a. Equipment included in training
- b. Intended audience
- c. Location of training
- d. Dates of training
- e. Objectives
- f. Outline of the information to be presented and subjects covered including description
- g. Start and finish times and duration of training on each subject

- h. Methods (e.g. classroom lecture, video, site walk-through, actual operational demonstrations, written handouts)
- i. Instructor names and instructor qualifications for each subject
- j. List of texts and other materials to be furnished by the Contractor that are required to support training
- k. Description of proposed software to be used for video recording of training sessions.

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

- a. Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.
- b. Relevant health and safety issues.
- c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.
- d. Design intent.
- e. Use of O&M Manual Files.
- f. Review of control drawings and schematics.
- g. Interactions with other systems.
- h. Special maintenance and replacement sources.
- i. Tenant interaction issues.

3.1.3 Training Outline

Provide the Operation and Maintenance Manual Files (Bookmarked PDF) and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

3.1.5 Unresolved Questions from Attendees

If, at the end of the training course, there are questions from attendees that remain unresolved, the instructor must send the answers, in writing, to the Contracting Officer for transmittal to the attendees, and the training video must be modified to include the appropriate clarifications.

3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00.00 10 QUALITY CONTROL.

-- End of Section --

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FACILITY DATA REQUIREMENTS (BUILDER)

05/18

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Air Force Civil Engineer SMS Playbook

BUILDER Systems/Components List

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SECTION 01 78 24.00 10

FACILITY DATA REQUIREMENTS (BUILDER)
05/18

PART 1 GENERAL

This specification requires the collection, organization, and turnover of electronic Facility Data for specific assets designed and constructed as part of this contract. Provide deliverables as defined in this specification. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 78 23 OPERATION AND MAINTENANCE DATA, for additional Facility Data delivery requirements.

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.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 19005-3	(2012) Document Management -- Electronic Document File Format for Long-Term Preservation -- Part 3: Use of ISO 32000-1 with Support for Embedded Files (PDF/A-3)
ISO 32000-1	(2008) Document Management -- Portable Document Format -- Part 1: PDF 1.7

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-2909	(2012) Geospatial Data and Systems
BUILDER Guide	Army BUILDER™ SMS Inventory and Assessment Guide

1.2 DEFINITIONS AND ABBREVIATIONS

1.2.1 Assets

Assets are specific items of property or equipment.

1.2.2 Attributes

Attributes are individual pieces of Facility Data that describe facilities and their associated assets.

1.2.3 Facility Data

Information defined and collected in the deliverables described herein.

1.2.4 Facility Data Project Execution Plan (FDPxP)

A document that describes the clear and organized plan for the collection, organization, and turnover of the Facility Data deliverables required by this specification.

1.3 UNITS OF MEASURE

Provide Facility Data deliverables utilizing the units of measure identified in the contract documents.

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 and information only. When used, a designation following the "G" designation 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

Facility Data Project Execution Plan(FDPxP); G, RO

FDPxP Coordination Meeting; G, RO

Submittal Demonstration Meeting; G, RO

SD-11 Closeout Submittals

Preliminary BRED Template and Report; G, RO

Final BRED Template and Report; G, RO

Final BUILDER Data Upload; G, RO

1.5 QUALITY ASSURANCE

1.5.1 Facility Data Project Execution Plan (FDPxP)

Provide the Government with a plan for the collection, organization, and turnover of the Facility Data deliverables to the Government. At a minimum, include the following items in the FDPxP:

1.5.1.1 Front Matter

Provide a Cover Page, Table of Contents, and Executive Summary/Objectives.

1.5.1.2 Project Information

List the Project Owner, Project Name, Project Location and address, Contract Type, Project Description, Project/Contract Number, Project Milestones.

1.5.1.3 Submittal Schedule

Identify delivery schedule for all deliverables in compliance with the submission requirements identified in this specification.

1.5.1.4 Personnel

Identify key personnel involved in the development of the Facility Data deliverables including Contractor and Government personnel.

1.5.1.5 Data Collection Content

Individually list every asset group from the facility data requirements that will require collection. This includes new and existing assets required to be evaluated/validated under this contract. No attribute data is required at this time. Identify any asset groups from the requirements that are not required within the scope of this Contract. Document the versions of forms and documentation standards to be used through the duration of the project.

1.5.1.6 Protocols

Detailed procedures:

- a. Facility Data documentation/collection process.
- b. Facility Data production/development process.
- c. Collaboration procedures including strategy, meetings, communication, and subcontractor/consultant involvement.
- d. Quality Control, including site verification of facility data, as applicable.
- e. File and folder naming structure(s).
- f. Hardware and software being used for collection and organization of Facility Data. Identify type, format, and anticipated organization of digital storage media to be provided as part of required deliverables. Include means and methods for checking deliverables for malicious content.

1.5.2 Meetings

To assure that Facility Data requirements are being met through the duration of the project, organize the following meetings and discuss the subsequent topics:

1.5.2.1 Post-Award Kickoff Meeting

At a minimum, discuss the following:

- a. The requirement for Facility Data deliverables under this contract.
- b. Primary roles and responsibilities associated with the development and delivery of the Facility Data deliverables, and
- c. Identify and agree upon a date and attendance list for the meetings described below:

1.5.2.2 FDPxP Coordination Meeting

- a. Facilitate a meeting following submission and Government review of the FDPxP. Include the Facility Data Preparer(s), Designer of Record (DOR), Quality Control (QC) Manager, Government's Facility Data Proponent, Contracting Officer's Representative, and Facilities Management Specialist (FMS). Also include any Government personnel required for obtaining security clearances and waivers for proper Facility Data collection in this meeting.

- b. The purpose of this meeting is to coordinate the efforts necessary by contract parties to ensure an accurate collection, preparation, quality control, and submittal of these deliverables.
- c. The FDPxP serves as the primary agenda for this meeting. At a minimum, discuss the following:
 - (1) Processes and methods of gathering facility data during construction. Discuss and obtain special permissions and/or waivers as necessary (photo waivers, data encryption, etc.);
 - (2) Contractor Quality Control practices and procedures;
 - (3) Corrective actions necessary for Government approval of FDPxP;
 - (4) Necessity for additional or recurring Facility Data Coordination Meetings outside of those required by this specification, as requested by the Contractor. Intent of these meetings would be to maintain regular contact between responsible parties of the Contractor and Government with regard to development of the facility data deliverables. Conduct status meetings with a frequency agreed upon at this meeting.

1.5.2.3 Submittal Demonstration Meeting(s)

- a. Facilitate a meeting following submission and Government review of each design or progress submittal of the Facility Data. Include the Facility Data Preparer(s), Designer of Record (DOR), Quality Control (QC) Manager, Government's Facility Data Proponent, Contracting Officer's Representative, and Facilities Management Specialist (FMS). Include Mechanical, Electrical, Plumbing, and Fire Protection subcontractors as applicable.
- b. The purpose of this meeting is to demonstrate ongoing compliance with the requirements identified in this specification.
- c. The applicable deliverables, along with Government remarks associated with review of these submittals serve as the primary guide and agenda for this meeting. At a minimum, discuss the following during this meeting:
 - (1) Review assets, applicable attributes, facility, and space data at time of submittal;
 - (2) Demonstrate Quality Control and site verification procedures, as applicable, by Contractor QC;
 - (3) Discuss Government review comments and/or unresolved items preventing completion and Government approval of the submittal.

1.5.3 Facility Turnover and Contract Closeout

Include the Facility Data Deliverables as a submittal in Facility Turnover and Contract Closeout procedures as defined in 01 33 00 SUBMITTAL PROCEDURES.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver facility data submittals in an organized, reviewable, and legible manner. Provide submittals adhering to the requirements of 01 33 00 SUBMITTAL REQUIREMENTS and 01 78 23 OPERATION AND MAINTENANCE DATA.

1.6.1 Malicious Content

Scan all files for malicious viruses using a commercially available scanning program that is routinely updated to identify and remove current virus threats.

1.6.2 Storage Media

Provide facility data on archival disk-based (DVD-R/RW) media. Any deviations from the required storage media must be approved by the Government. Select and apply technology used for electronic data transmission to ensure that the full Facility Data submittal for each facility is provided on one single disk, whenever possible.

- a. Apply a label directly printed to storage media. Do not provide adhesive, paper-based labels. List the name of the facility, Project, Project location, Contract number, Designer of Record firm/Prime Contractor company's name, title of submission, and security classification (in accordance with the appropriate security classification labeling regulations) on the label. If multiple disks are provided, clearly document the contents of each disk on the label.
- b. Include the name and contact information of the individual who produced the final data disk to ensure that any problems with the data or media can be easily resolved.

PART 2 PRODUCTS

2.1 FACILITIES

Facilities that require individual (separate and complete) Facility Data deliverables as described in this specification are as follows:

- a. Bldg. 631
Comm Hut Facility

2.2 BUILDER Existing and Renovated Building Inventory and Assessment

Conduct and provide a BUILDER Initial Building Inventory and Assessment for each facility listed above. Coordinate access and upload of data to the Grand Forks AFB BUILDER Sustainment Management System (SMS).

Coordinate access to existing facility data with appropriate Grand Forks BUILDER Sustainment Management System (SMS) personnel. Manage revisions offline via BUILDER Remote Entry Database (BRED) file(s) until final approval by the Government. Upon approval, coordinate access and upload of data to the Grand Forks AFB BUILDER Sustainment Management System (SMS).

Inventory and assessment shall comply with BUILDER Guide, as amended by Air Force SMS Playbook, attached to this specification. See <https://www.sms.erdcdren.mil/> for the BUILDER Guide and for additional information and resources. A list of BUILDER Systems/Components has been attached to this specification for reference, but shall not limit

completion of the full inventory and assessment in compliance with applicable Air Force and Grand Forks AFB requirements and formatting standards.

2.2.1 BUILDER Personnel Experience Requirements

The Contractor shall be responsible for planning, management, collection, quality control, and upload of data to the Grand Forks AFB BUILDER SMS. Provide personnel with experience and qualifications as appropriate for the scope, scale, and effort required for this deliverable. Personnel shall comply with all training requirements for Antiterrorism, OPSEC, safety, etc, as applicable to their role on the project, and as referenced in the entirety of this contract. Document these personnel with qualifications in the FDPxP. Provide not less than one BUILDER data manager with credentials adequate to obtain a Department of Defense (DoD) Common Access Card (CAC) in order to obtain access and upload facility data to the Grand Forks AFB BUILDER SMS. The BUILDER data manager shall be present and capable of testing and directly uploading data to the SMS on site at Grand Forks AFB, once approved by the Government. Location and other logistical items will be coordinated after contract award.

2.2.2 BUILDER Equipment Requirements

Provide all equipment and processes for collecting the required BUILDER data. Document intended processes, procedures, and equipment in the Advanced Modeling PxP.

2.2.3 BUILDER Implementation Plan

Specifically address the BUILDER Initial Building Inventory and Assessment in the FDPxP - to include (but not limited to) personnel, equipment, project-specific requirements/accommodations, safety, data management, coordination, processes and procedures, quality control, and deliverables.

2.2.4 BUILDER Government-Furnished Materials (GFM)

The Contractor may request GFM to support BUILDER data collections after contract award. This may include the Air Force-specific formatting requirements or an Air Force Builder Remote Entry Database (BRED) template. In the event that the Government chooses not to provide these resources, the Contractor shall provide BUILDER deliverables in compliance with BUILDER Guide and compliance with the most current published BRED template available at <https://www.sms.erdcdren.mil/>.

2.2.5 Preliminary BRED Template and Report

Provide a preliminary BRED Template for Government review and acceptance at approximately 70 percent construction complete. This BRED Template shall include all data available at the time of deliverable submission. The intent of this deliverable is for general quality assurance of content and formatting.

With the template, provide an initial assessment and inventory report including a summary of the planned versus executed scope of the installation, the executed schedule, challenges, safety concerns, critical decisions made, and lessons learned. As appendices to the report provide all supporting documentation for the inventory and assessment - including but not limited to photos, calculations, roof reports, in-brief/out-brief reports, daily reports, sketches, GIS data, and walk sheets.

2.2.6 Final BRED Template and Report

Provide a final BRED Template for Government review and acceptance as soon as all data required is collected, compiled, and assessed - but not later than 60 days after Beneficial Occupancy Date (BOD). One-hundred percent accuracy of BRED data is required for Government acceptance of this deliverable.

With the template, provide an updated, finalized assessment report with appendices as described above.

2.2.7 Final BUILDER Data Upload

Upload the final, accepted BRED data to the Grand Forks AFB BUILDER SMS, only after full acceptance of the Final BRED Template and Report. The contractor shall work with Grand Forks AFB personnel to upload the final, approved data to the Grand Forks AFB BUILDER SMS. The Contractor's BUILDER data manager shall be on site and available for this process and to answer any questions regarding data content and quality.

PART 3 EXECUTION

3.1 CONSTRUCTION FINAL SUBMITTALS

Submit the Preliminary BRED Template and Report as the project approaches completion and all facility assets are defined. Provide the Final BRED Template and Report submittal only after Government acceptance and approval of the Preliminary BRED Template and Report.

3.2 FACILITY DATA VERIFICATION

Verify the submittals through the quality control personnel and procedures as defined in the FDPxP. One-hundred percent accuracy of Facility Data is required for Government acceptance of the Final BRED Template and Report and prior to Final BUILDER Data Upload.

Attachments: Air Force Civil Engineer SMS Playbook
BUILDER Systems/Components List

-- End of Section --

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 78 36.00 24

WARRANTY OF CONSTRUCTION AND DESIGN

4/07

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SECTION 01 78 36.00 24

WARRANTY OF CONSTRUCTION AND DESIGN

4/07

PART 1 GENERAL

1.1 WARRANTY OF CONSTRUCTION

(a) Foremost and in addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements;
or

(2) Any defect of equipment, material, workmanship, or design furnished by the Contractor.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause.

(e) The Contractor's warranty with respect to work restored, repaired or replaced will run for 1 year from the date of restoration, repair or replacement. This provision applies equally to all items restored, repaired, or replaced under paragraph (c) and (d) above.

(f) The Government will notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage. Repair work necessary to correct a warranty condition which arises to threaten the health or safety of personnel, the physical safety of property or equipment, or which impairs operations, habitability of living spaces, etc., will be performed by the Contractor on an immediate basis as directed verbally by the Government. Written verification will follow verbal instruction.

(g) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of verbal or written notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(h) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(i) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(j) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(k) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

1.2 ADDITIONAL WARRANTY REQUIREMENTS

1.2.1 Performance Bond

(a) It is understood that the Contractor's Performance Bond will remain effective for one (1) year from the date of acceptance.

(b) If either the Contractor or his representative doesn't diligently pursue warranty work to completion, the contractor and surety will be liable for all costs. The Government, at its option, will either have the work performed by others or require the surety to have it done. Both direct and administrative costs will be reimbursable to the Government.

1.2.2 Pre-Warranty Conference

(a) Prior to contract completion and at a time designated by the Contracting Officer or his authorized representative, the Contractor shall meet with the Contracting Officer or his authorized representative to develop a mutual understanding with respect to the requirements of the Paragraph: WARRANTY OF CONSTRUCTION. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect and other details deemed necessary by the Contracting Officer or his authorized representative for the execution of the construction warranty shall be established/reviewed at this meeting.

(b) In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of the service

representative which is authorized to initiate and pursue warranty work action on behalf of the Contractor and surety. This single point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any Contractual responsibilities in connection with the paragraph: WARRANTY OF CONSTRUCTION.

(c) Local service area is defined as the area in which the contractor or his representative can meet the response times as described in paragraph 1.2.4 and in any event shall not exceed 200 miles radius of the construction site.

1.2.3 Equipment Warranty Identification

The Contractor shall provide warranty identification tags on all mechanical and electrical equipment installed under this contract. Tags and installation shall be in accordance with the requirements of Paragraph: EQUIPMENT WARRANTY IDENTIFICATION TAGS.

1.2.4 Warranty Service Calls

The Contractor or his local service representative will respond to the site, to a call within the time periods as follows: Four (4) hours for Heating, Air Conditioning, Refrigeration, Air Supply and Distribution, Critical Electrical service Systems and Food Service Equipment and Twenty-Four (24) hours For All Other Systems.

1.2.5 Equipment Warranty Booklet

At or before 30 days prior to final inspection and acceptance of the work, the Contractor shall submit the data mentioned as follows:

The Contractor shall provided a Booklet, which consists of a listing of all equipment items (see paragraphs a. and b. below) which are specified to be guaranteed along with the warranty papers for each piece of equipment. Three (3) legible bound copies of the booklet shall be submitted for approval and shall be indexed alphabetically by equipment type. For each specific guaranteed item, the name, address, and telephone number shall be shown on the list for the subcontractor who installed equipment, equipment supplier or distributor, and equipment manufacturer. Completion date of the guarantee period shall correspond to the applicable specification requirements for each guaranteed item. The names of service representatives that will make warranty calls along with the day, night, weekend and holiday contacts for response to a call within the time period specified shall also be identified.

a. For Equipment in Place: The equipment list shall show unit retail value and nameplate data including model number, size, manufacturer, etc. This would include capital equipment and other nonexpendable supplies of a movable nature that are not affixed as an integral part of the facility and may be removed without destroying or reducing the usefulness of the facility. Some examples are spare parts, special tools, manufacturing equipment, maintenance equipment, instruments, installed under this contract.

b. For Installed Building Equipment: The equipment list shall show unit retail value and nameplate data including model number, size,

manufacturer, etc. This would include items of equipment and furnishings (including material for installation thereof), which are required to make the facility usable and are affixed as a permanent part of the structure. Some examples are plumbing fixtures, laboratory counters and cabinets, kitchen equipment, mechanical equipment, electrical equipment, and fire protection systems installed under this contract.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

Equipment Warranty Booklet

1.4 EQUIPMENT WARRANTY IDENTIFICATIONS TAGS

1.4.1 GENERAL REQUIREMENTS

The Contractor shall provide warranty identification tags on all Contractor and government furnished equipment which is Contractor installed.

1.4.1.1 Tags and Information

The tags and information shall be similar in format and size to the exhibits provided by this specification, and shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and shall be installed in a position that is easily (or most easily) noticeable. If the equipment surface is not suitable for adhesive back, Contractor shall submit his alternative to the Contracting Officer's Authorized Representative for review and approval. Contractor furnished equipment that has differing warranties on its components will have each component tagged.

1.4.1.2 Tags for Warranted Equipment

The tag for his equipment shall be similar to the following:

EQUIPMENT WARRANTY	
CONTRACTOR FURNISHED EQUIPMENT	
MFG-----	MODEL NO.-----
SERIAL NO.-----	
CONTRACT NO.-----	
CONTRACTOR NAME-----	
CONTRACTOR ADDRESS-----	

CONTRACTOR TELEPHONE-----
CONTRACTOR WARRANTY EXPIRES-----
IN CASE OF WARRANTY ACTION FIRST CONTACT
CES AT [TELEPHONE NUMBER]

EQUIPMENT WARRANTY	
GOVERNMENT FURNISHED EQUIPMENT	
MFG _____	MODEL NO. _____
SERIAL NO. _____	
CONTRACT NO. _____	
DATE EQUIP PLACED IN SERVICE _____	

1.4.1.3 Exclusion to Providing Tags

If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag. The Contractor's warranty expiration date and the final manufacturer's warranty expiration date will be determined as specified by the Paragraph "WARRANTY OF CONSTRUCTION".

1.4.2 EXECUTION

The Contractor will complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment. The Contractor shall be responsible for scheduling acceptance inspection with the Contracting Officer (verbal and written notification required). If this inspection is delayed by the Contractor, the Contractor shall, at his own expense, update the in-service and warranty expiration dates on these tags.

1.4.3 Equipment Warranty Tag Replacement

Under the terms of this contract, the Contractor's warranty with respect to work repaired or replaced shall run for one year from the date of repair or replacement. Such activity shall include a data warranty identification tag on the repaired or replaced equipment. The tag shall be furnished and installed by the Contractor, and shall be similar to the original tag, except that it should include the scope of repair and that the contractor's warranty expiration date will be one year from the date of acceptance of the repair or replacement. In the case of repair, the repair only will be covered by the extended warranty. In the case of replacement of a component, the component only will be covered by the

extended warranty. In these cases, the original tags will not be removed, but an additional tag will be installed for the repair or component replacement.

1.5 WARRANTY OF DESIGN

(a) Foremost and in addition to any other warranties in this contract, the Contractor warrants that the design shall be performed in accordance with the Contract requirements. Design and design related construction not conforming to the Contract requirements shall be corrected at no additional cost to the Government. The standard of care for design is defined in paragraph (b) of Section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS "RESPONSIBILITY OF THE CONTRACTOR FOR DESIGN".

(b) The period of this warranty shall commence upon final completion and the Government's acceptance of the work, or in the case of the Government's beneficial occupancy of all or part of the work for its convenience, prior to final completion and acceptance, at the time of such occupancy.

(c) This design warranty shall be effective from the above event through the Statue of Limitations and Statute of Repose, as applicable to the state that the project is located in.

(d) The rights and remedies of the Government provided for under this clause are in addition to any other rights and remedies provided in this contract or by law.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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ATTACHMENTS:

Modifications and Title Block Examples

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SECTION 01 78 39.00 24

AS-BUILT DRAWINGS
02/22

PART 1 GENERAL

Attachments: Modifications and Title Block Examples

1.1 DEFINITIONS

The definitions listed below form a part of this specification.

1.1.1 Red-Line Drawings

Accepted designContract drawings marked-up during construction to show actual work performed to include necessary sketches, modification drawings, shop drawings and notes.

1.1.2 As-Built Drawings

Electronic CAD Files developed from the accepted design contract drawings that include all of the information from the redline drawings and suitable for half-size reproduction. Building Information Modeling (BIM) files are considered a part of As-Built Drawings. See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for additional requirements and deliverables.

1.1.3 Black-Line Drawings

Paper drawings reproduced from electronic CAD files or high quality reproducible drawings.

1.1.4 Full-Size Drawings

22 inches x 34 inches nominal size drawings with all details visually readable so that half-size plot will fit on 11 inches x 17 inches cut sheets.

1.1.5 Modification Circle

A circle with a horizontal line through the center to identify modification changes on the drawings. The top half will contain the letter "R" with the bottom half containing the Modification number, unless directed otherwise. The lettering standard will be 1/8-inch Arial.ttf.

1.1.6 Electronic CAD Files

See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS.

1.1.7 Issued for Construction Drawings

Design drawings created by the design-build contractor for the construction phase of the contract that have been reviewed and accepted by the Government.

1.1.8 Building Information Modeling (BIM) Files

See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for definition.

1.1.9 Geodetic Datum

See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for definition.

1.1.10 State Plane Coordinate System (SPCS)

See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for definition.

1.2 REFERENCES

U.S. ARMY CORPS OF ENGINEERS (USACE)

ERDC/ITL TR-19-7 (2019) A/E/C CAD Standard - Release 6.1

EM 1110-1-2909 (2012) Geospatial Data and Systems

USACE A/E/C A/E/C CAD Standards, Most Current Release
<https://cadbimcenter.erdcdren.mil/>

1.3 SUSTAINABILITY REQUIREMENTS

Materials in this technical specification may contribute towards contract compliance with sustainability requirements. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for project requirements.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation 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

100 Percent Preliminary As-Built Drawings; G-RO

SD-11 Closeout Submittals

Final As-Built Drawings; G-RO

Sustainability Documentation; G-DO

1.5 GENERAL REQUIREMENTS

1.5.1 As-built Drawings

Create electronic CAD files, BIM files and Red-Line Drawings showing As-Built conditions. Provide as-built Building BIM model in compliance with USACE Minimum Modeling Matrix (M3) for Level of Detail (LOD) and element Grade for "Record Models" as referenced in Section 01 33 39.00 10

ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS. Use the ERDC/ITL TR-19-7 USACE A/E/C CAD Standard for the As-Built drawings. Obtain the A/E/C Standards in effect at time of Contract Award. The A/E/C Standards are available at:

<https://cadbimcenter.erdcdren.mil/>

(New users will be required to register. See "New User Registration" at the website indicated above.)

Obtain the required CAD software and BIM software for Contractor use. **Do not convert electronic drawing files from one software language to another unless as specifically allowed or required in Section 01 33 39.00 10**

ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS. Show the transmittal requirements for the As-built Drawings as activities on the Contractor-prepared project schedule.

Show all changes from the accepted designcontract drawings on the as-builts. Accurately and neatly record all changes on the As-built drawings using the same symbols, terminology, and general quality as the original set of accepted designcontract drawings. Show all changes on all drawings that are affected by the change. Changes include: actual work performed, deviations resulting from Government responses to Requests for Information or Serial letters, surveys, shop drawings, descriptive changes, sketch changes, and modifications to the contract. Show all systems designed or enhanced by the Contractor such as HVAC control system, fire alarm system fire sprinkler system, and irrigation sprinkler system, on the As-built drawings. Where accepted designcontract drawings or specifications allow for options, only show the option selected and actually constructed on the As-Built Drawings.

1.5.2 Red-Line Drawings

Update Red-Line Drawings throughout the construction phase of the contract showing all changes that will be shown on the final as-builts. Place all as-built conditions on the Red-Line Drawings **within two (2) days** after completing the work activity or it shall be entered on the deficiency tracking system (see Section 01 45 00.00 10, QUALITY CONTROL). The Government will consider the Contractor to not be making satisfactory progress and will withhold funds from progress payments if the Contractor does not completely and accurately update the as-built drawings.

Provide red-line drawings in an electronic format.

1.5.2.1 Electronic Red-Lines

Make electronic red-line drawings available to the COR at all times through a Local Area Network (LAN) or Internet connection. The connection shall have a download transfer rate not less than 10 Megabit/second (~1.250 Megabytes/second) and an upload transfer rate of not less than 1 Megabit/second (~124 kilobytes/second) in order to facilitate the timely access of drawing files. Make backups of all the electronic drawings at the close of business on the final day of work each week on a durable digital media such as removable hard-drive, tape drive, or optical disk. Preserve each weekly file system backup over the course of the project and do not overwrite; label the file folders or individual media with the date of backup. Store the weekly backup media in a fireproof and waterproof safe in a locked room of the Contractor's trailer. Electronically provide the COR with updated PDF drawings on a monthly basis. Show all changes to

the electronic drawings with clouding and in accordance with ERDC/ITL TR-19-7.

1.5.3 GeoDataBase

Provide digital media containing a SDSFIE/FGDC GeoReferenced personal GeoDataBase, in accordance with the requirements of this section and EM 1110-1-2909, unless otherwise directed by the Contracting Officer.

See Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for applicable references and requirements.

1.5.4 Sustainability Documentation

All Sustainability documentation that was submitted in to the Third Party Certification (TPC) organization and indicates compliance with related Federal Mandates shall be submitted once Sustainability Documentation is finalized. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for detailed requirements. Submit all Sustainability documentation within 90 days after the final inspection. Place the Sustainability documentation on two DVDs and send one copy sent to the COR and the other to the Omaha District Office (ATTN: Patricia Lambert, CENWO-CDS-C).

1.6 PAYMENT

In accordance with the clause "Payment Under Fixed - Price Construction Contracts", cost load closeout activities amounts in accordance with Section 01 32 01.00 10 PROJECT SCHEDULE not less than \$35,000 or 1 percent of the present contract value, which ever is greater, up to \$200,000. This amount will be withheld from payment for the creation of As-Built Drawings until Final As-Built Drawings and GeoDatabase Files are delivered to and accepted by the COR.

1.7 CONTRACTOR PERFORMANCE RATING

The Government will evaluate the Contractor's performance in CPARS (Contractor Performance Assessment Reporting System) at intervals of no more than 365 days during the period of performance and complete the final evaluation within 120 days of completion of the project. The timeliness and quality of As-Built drawings submittals, Final As-built Drawings, Red-line drawings, Sustainability Documentation, and GeoDataBase Files will be an important factor in determining the assigned rating for the Schedule evaluation area. If the Contractor fails to submit complete and accurate Final As-Built Drawings and GeoDataBase Files within sixty (60) calendar days of turning the completed project over to the Using Service, this failure will be noted in the comments under the Schedule evaluation area and may result in a lower rating for this area. Repeated failure to submit correct and accurate As-Built drawings submittals, Final As-built Drawings, Red-line drawings, Sustainability Documentation, and GeoDataBase Files may also result in lower ratings for the Quality and Management evaluation areas. The Contractor shall receive an Unsatisfactory rating for Sustainability documentation if Sustainability documentation is not submitted within 90 days after the final inspection.

1.8 TRANSMITTAL OF AS-BUILT DRAWINGS

1.8.1 Optional As-built Drawings Sample

Optionally submit a sample of preliminary as-built drawings to the Omaha

District Office that will be reviewed for formatting purposes. Include five distinct sheets from the project drawings in this submittal. Send this optional submittal on approved digital media to the Omaha District Office (ATTN: Patricia Lambert, CENWO-CDS-C) and include the following:

- a. Electronic CAD/BIM/CIM Files
- b. Individual PDF Drawings
- c. One (1) Combined Set of full-size PDF Drawings with bookmarks for each sheet

1.8.2 100 Percent Preliminary As-Built Drawings

The 100 Percent Preliminary As-Built Drawings include all changes to the drawings as specified. The 100 Percent Preliminary As-Built Drawings will be reviewed for technical content and formatting requirements. Within thirty (30) days after the final inspection, submit 100 Percent Preliminary As-Built Drawings indicating all as-built changes with "clouding" on all of the project drawings. Submit all drawings contained in the complete project set of drawings plus any additional drawings with the 100 Percent Preliminary As-Built Drawings. The COR may grant the Contractor additional time if the Contractor is making reasonable progress on the as-builts, in the sole judgment of the COR. Do not submit the Final As-Built Drawings until the 100 Percent Preliminary As-Built Drawings are approved. Include the following on the approved digital media for the 100 Percent Preliminary As-Built Drawings (ATTN: Patricia Lambert, CENWO-CDS-C):

- a. All documents and files required under "Advanced Modeling Submittal Packaging" paragraph of Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS.
- b. Current electronic red-line drawings for reviewing purposes.

1.8.3 Final As-Built Drawings

Produce Final As-Built Drawings without "clouding". Include all changes shown on the 100 Percent Preliminary As-Built Drawings plus any additional required changes on the Final As-Built Drawings. Submit all drawings contained in the complete project set of drawings plus any additional drawings with the Final As-Built Drawings. Submit the Final Drawings no later than ten days after the 100 Percent Preliminary As-Built Drawing submittal is approved. The COR may grant additional time if the Contractor is making reasonable progress on the as-builts. Send the following to the COR:

Three approved digital media containing the following:

- a. All documents and files required under "Advanced Modeling Submittal Packaging" paragraph of Section 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS.
- b. Current electronic red-line drawings for reviewing purposes.

Include one hardcopy set of half-size black-line drawings on bond paper in documents sent to COR.

Send one copy of the digital media only to the Omaha District Office (ATTN: Patricia Lambert, CENWO-CDS-C).

1.9 AS-BUILT DRAWINGS FORMAT REQUIREMENTS

1.9.1 General Formatting

Prepare As-built Drawings in accordance with Design Architect-Engineer CAD requirements and/or match the detail shown on the contract accepted design drawings. Include all of the requirements below on the drawings:

- a. Update the drawing index when drawings are added.
- b. When opened, ensure the view is zoomed to fit the border.
- c. Reference a border supplied by the CAD/BIM Technology Center (<https://cadbimcenter.erdcdren.mil/>) placed in the layout/sheet model at a scale of 1 at the location (0,0) in all files.
- d. Delete all unnecessary information outside the border.
- e. Purge/compress all files.
- f. Include all reference files in appropriate folders within the provided workspace.
- g. Use the Arial.ttf font for all text.
- h. Provide an ASCII text file with the following information: the name and phone number of the person we need to contact if we have problems, and the version of the CAD software used to create and/or work on the drawings.
- i. (CAD only) Supply pen tables for plotting.
- j. (CAD only) Provide each sheet/design with its own file and file name with only one layout/sheet per design file.
- k. (CAD only) Accomplish half toning by using the color 8 and setting the pen table to plot color 8 to half tone.
- l. The file name is the project code followed by the sheet identification number. Include the file name in the border on every sheet and match the name of the file on the Digital Media. The project code is GFND00100.
- m. Include the File number in the border on every sheet. The file number is: (the Contract number, to be provided at award).
- n. Change the cover sheet from "Contract Award Set" to "As-Built Record Set" with month & year completed.
- o. Show drawing changes by "clouding" the affected area in layer "G-ANNO-REVS" (CAD only) in the drawing file of all preliminary as-builts and redlines. For BIM, accomplish clouding commensurate with the available tools.
- p. Place all submitted Electronic CAD Files and PDF drawings under a folder labeled "As-Built" on the submitted Digital Media.
- q. Include the name of the project, location, project code, solicitation number, contract number, and words detailing which submittal it is on both the Digital Media case and Digital Media. Title the Final As-builts Drawings "As-Built Record Set".
- r. Do not use zipped or compressed folders on any of the As-built submittals.
- s. On the cover sheet add or revise text to read "This folio includes all reissued and descriptive amendments, RFIs, and modifications."
- t. Place the Electronic CAD native design files and PDF drawings in separate folders on the Digital Media.

1.9.2 Title Block

Fill in and correct all information in the title block. Include all the requirements below in the title block.

- a. Add "RECORD DRAWING" text below the title block on the right side of the drawing on all sheets.

- b. Add the date in the revision box for modifications from Block 3 of Form SF-30.
- c. State "REVISED TO SHOW AS-BUILT CONDITIONS" and date the top line of the revision box. Use a "-" for the "Mark".
- d. Enter the month and year as-builts were completed in the date box.
- f. Insert the initials "PEL" in the approved box.
- e. Show the contract number and the solicitation number (if available) on all sheets.
- f. Properly identify additional word abbreviations, not found on the abbreviation sheet but necessary to describe the work, and incorporate with the other standard word abbreviations.
- g. Properly note modifications in the title block in accordance with paragraph "Modification Changes" below.

1.9.3 Modification Changes

Include all modification changes on the as-built drawings. At a minimum, include all revised and reissued sheets, descriptive changes, sketches, etc. Change other sheets as appropriate with any modification change that also affects other sheets other than the one referenced with the modification. Typically, modification changes can be done by following the descriptive change included with the modification, but may require additional effort depending on the change and level of detail of the modification change. Post modifications in accordance with the following:

- a. Follow directions in the modification for posting all changes.
- b. Post all modifications to the contract in chronological order.
- c. Show the last modification number completed on the sheet with the modification circle in the top right corner of the "Project Title" and "Project Location" box.
- d. Place a modification number in the revision box over column entitled "Mark" for all modifications to plans, sections, or details. Use the statement "GENERAL REVISIONS" when applicable.
- e. Make the Modification Circle size 1/2-inch diameter unless the area where the circle is located is crowded. Use a smaller size circle for crowded areas.
- f. Place a Modification Circle at the location of each deletion.
- g. For all new details or sections that are added to a drawing, place a Modification Circle by the detail or section title.
- h. For changes to a drawing, place a Modification Circle by the title of the affected plan, section or detail titles (each location).
- i. For changes to schedules on drawings, place a Modification Circle either by the schedule heading or by the change in the schedule.

1.9.4 Legends

Do not use symbols which conflict with those on the original accepted designcontract legend sheet. Properly identify and add to the legend sheet or supplemental legend additional symbols necessary to depict any additional work items. Those projects that do not have legend sheets may use supplemental legends on each sheet where symbol is shown.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

Make revisions to and maintain the red-line and as-built drawings to the

same level of detail as shown on the original accepted designcontract drawings. Provide any additional drawings as required to display all details. In addition, prepare the GeoDatabase Files as specified above and submit in conjunction with the As-Built drawings.

3.2 SITE WORK

3.2.1 Utilities

Show all utilities whether active or abandoned on the as-built drawings and include all those shown on the original accepted designcontract drawings or found on-site. Show the type of utility, location, general direction, size, material make-up and depth. Show the location and description of any utility line or other installations of any kind known to exist within the construction area. Include dimensions to permanent features as part of the location. Locate during installation all new underground utility lines (including electrical power and communications, gas, water, sanitary sewer, storm drains, roof drains and culverts). Survey pipe invert of gas, water, sanitary sewer, storm drains, roof drains and culverts and top of duct bank of electrical power and communications lines and associated fixtures (valves, manholes, test points, meters, cathodic protection points, tanks, ground points, and all point features along the new utility lines). Survey storm drains and sanitary sewer lines where pipes enter manholes and inlets and at 100-foot maximum intervals along the line. Survey the inverts of all cleanouts and tees. Survey inverts at each end of culverts. Survey electrical power, communications, gas and water lines at all manholes, tees, valves, corners, changes in direction and at intervals along the line to accurately depict the location of the line in both horizontal and vertical directions (50-foot maximum interval). Make the horizontal and vertical accuracy such that 100% of the points are + 0.25' of their absolute position.

3.2.2 Structures

Show structures above and below ground. Show the size, material make-up, location, height, and/or depth. Show rim elevation and invert elevations as applicable at manholes. Show electrical equipment, guy wires, and voltage rating on power poles.

3.2.3 Grades

Correct grade or alignment of roads, structures, or utilities if any changes were made from the contract drawings. Correct elevations if changes were made in site grading. If any grades were finalized outside of the respective grades tolerances, show that new grade on the as-builts.

3.3 STRUCTURAL

3.3.1 Steel/Concrete

Incorporate shop drawings that deviate from the accepted designcontract drawings in the As-Built Drawings.

3.4 MECHANICAL

3.4.1 Ductwork

Show ductwork to reflect actual installation and duct size. Show ductwork

routing changes.

3.4.2 Plumbing

Show piping and fixtures to reflect the type of material, size and the route or location.

3.5 ELECTRICAL

3.5.1 PANELS

Revise all accepted designcontract drawing panel schedules to show as-built conditions. Ensure home-run circuit designation on electrical drawingsaccurately correspond to the as-built panel schedules.

3.5.2 Controls

Revise all control diagrams in accepted designcontract drawings to reflect as-built conditions and setpoints.

3.6 CONTRACTOR SHOP DRAWINGS

Incorporate contractor shop drawings, which supersede data on the accepted designcontract plans and/or additional drawings, prepared by the Contractor, into the As-Built Drawings. Include the designer's name on the As-Built Drawings for any design plans prepared by the Contractor.

-- End of Section --


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RECORD DRAWING

DEFINITIONS OF REVISIONS:

- 1. LAST ENTRY IN DESCRIPTION BOX SHALL APPLY TO AS-BUILT CONDITIONS
- 2. REVISIONS BY MODIFICATION. (AFTER AWARD OF CONSTRUCTION CONTRACT).
- 3. METHOD OF ADDING NEW DRAWING BY MODIFICATION.
- 4. REVISIONS BY AMENDMENT WHEN WRITTEN "WORD DESCRIPTIVE" AMENDMENT IS ISSUED AND DRAWINGS ARE POSTED FROM WRITTEN DESCRIPTIONS AFTER THE ISSUE DATE.
- 5. REVISIONS BY AMENDMENT WHEN DRAWING IS TO BE RE-ISSUED.
- 6. METHOD OF ADDING NEW DRAWING BY AMENDMENT.
NOTE: DELTA NUMBER MATCHES AM. NUMBER

INSTRUCTIONS FOR NOTING REVISIONS:





- 1. ADD THE REVISION DESCRIPTION (EITHER CHANGE ORDER, AMENDMENT OR MODIFICATION DESCRIPTION AS APPLICABLE).
- 2. ADD THE PROPER REVISION SYMBOL TO THE LEFT OF THE REVISION NOTATION.
- 3. ADD THE PROPER AMENDMENT OR MOD. SYMBOL NEAR EACH REVISED ITEM IN THE BODY OF THE DRAWING.
- 4. ADD ARCHITECT-ENGINEERS INITIALS IN APPROVED BLOCK WHEN A-E IS RESPONSIBLE FOR AMENDMENT OR MODIFICATION.
- 5. WHEN ADDING A NEW DRAWING TO SHOW SUPPLEMENTAL DATA, USE SAME DRAWING NUMBERS AS DRAWING WITH SIMILAR SUBJECT MATTER AND ADD AN ALPHABETICAL SUFFIX TO THE SHEET NO. THIS DRAWING SHOULD BE ADDED TO THE INDEX OF DRAWINGS IN ITS PROPER PLACE ACCORDING TO THE SHEET NUMBER.
- 6. FOR MODIFICATION ONLY:
ADD A 1/2 INCH ENCIRCLED  INSIDE OF TITLE BLOCK SHOWING THE LAST MOD NUMBER COMPLETED. ALSO USE THIS NEAR EACH REVISED ITEM IN THE BODY OF THE DRAWING.

REVISION DESCRIPTIONS - FOR AMEDMENTS AND/OR MODIFICATIONS:

- CHANGE ORDER #000X (DESCRIPTION & REASON FOR CHANGE ARE THE SAME AS AMENDMENTS LISTED BELOW)
- AM. #000X REISSUED FOR CLARITY (DRAWING IS HARD TO READ - BLURRY)
- AM. #000X GENERAL REVISIONS (THIS WOULD BE FOR ANY RE-ISSUED DRAWINGS, TYPICAL CHANGES OR CORRECTIONS)
- AM. #000X REVISED AND REDRAWN (MAJOR OVERHAUL OF THE DRAWING, TOO MANY CHANGES TO INDICATE INDIVIDUALLY)
- AM. #000X NEW DRAWING ADDED (DRAWING THAT WAS NOT ORIGINALLY INCLUDED IN THE ADVERTISED SET)
- REVISED IN ACCORDANCE WITH AM. #000X (THIS IS FOR DESCRIPTIVE CHANGES THAT WENT OUT IN THE AMENDMENT - DRAWING IS NOT RE-ISSUED - AND THE CHANGES ARE THEN LATER POSTED TO THE DRAWINGS AS IT BECOMES A CONTRACT SET)
- (DASH) REVISED TO SHOW AS-BUILT CONDITIONS

SHEET IDENTIFICATION NUMBER	PROJECT TITLE PROJECT LOCATION Y Y	U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS	DESIGNED BY:	DATE:	<div><div>REVISIONS</div><div><div>REVISOR</div><div>DATE</div><div>APPROVED</div><div>DATE</div><div>APPROVED</div></div></div>	REVISOR				DATE				APPROVED				
			DWN BY:	CKD BY:		SOLICITATION NO.:	REVISOR				DATE				APPROVED			
			SUBMITTED BY:			CONTRACT NO.:	REVISOR				DATE				APPROVED			
			FILE NAME:			FILE NUMBER:	REVISOR				DATE				APPROVED			
SIZE:		PLOT SCALE:		PLOT DATE:		REVISOR				DATE				APPROVED				
					MARK	DESCRIPTION				DATE				APPR.				

DESIGNED BY: INITIALS OF DESIGNER		DATE: CURRENT DATE: MONTH AND YEAR EXAMPLE: JUNE 2012	
DWN BY: INITIALS OF CAD TECH. OR DESIGNER	CKD BY: INITIALS OF REVIEWER	SOLICITATION NO.: THIS NUMBER IS ASSIGNED BY CONTRACTING AND ADDED TO TITLE BLOCK AT THE TIME OF PLOTTING ADVERTISEMENT DRAWINGS	
SUBMITTED BY: INITIALS OF REVIEWER/DESCIPLINE SECTION CHIEF		CONTRACT NO.: THIS NUMBER IS ASSIGNED BY CONTRACTING AND ADDED TO TITLE BLOCK AT THE TIME OF PLOTTING CONTRACT AWARD DRAWINGS	
FILE NAME:* NAME OF CADD FILE: FILE NAMES SHOULD BEGIN WITH THE PROJECT CODE ASSIGNED BY THE CAD MANAGER. SEE A/E/C CADD STANDARDS FOR SHEET FILE NAMING CONVENTION		FILE NUMBER:** THIS NUMBER IS ASSIGNED BY PROJECT COORDINATOR AND ADDED TO TITLE BLOCK AT THE BEGINNING OF THE PROJECT	
SIZE: AUTO GENERATED INFO. DO NOT EDIT	PLOT SCALE: AUTO GENERATED INFORMATION DO NOT EDIT	PLOT DATE: AUTO GENERATED INFORMATION DO NOT EDIT	

-	REVISED TO SHOW AS-BUILT CONDITIONS	08-14-2012	
R-5	REVISED AND REDRAWN	07-03-2012	
R-4	GENERAL REVISIONS	06-17-2012	
R-1	NEW DRAWING ADDED	03-27-2012	
	REVISED IN ACCORDANCE WITH AM. NO. 0007	03-17-2012	
	AM. #0003 GENERAL REVISIONS	02-27-2012	
	AM. #0001 NEW DRAWING ADDED	02-17-2012	
	CHG. ORDER #0001 GENERAL REVISIONS	02-12-2012	R.W.S.
MARK	DESCRIPTION	DATE	APPR.

**REVISION SYMBOL AND/OR NUMBER:
SEE EXAMPLE ABOVE AND/OR
AMENDMENT/MOD EXAMPLE DRAWING FOR CLEARIFICATION**

**INDICATES REVISION TYPE AND DESCRIPTION:
SEE EXAMPLE ABOVE AND/OR
AMENDMENT/MOD EXAMPLE DRAWING FOR CLARIFICATION**

— **DATE OF REVISION**

INITIALS (IF REQUIRED) BY REVIEWER/DISCIPLINE SECTION CHIEF

— SHEET IDENTIFICATION NUMBER:

— DISCIPLINE DESIGNATOR
w/ Level 2 Designator
(see A/E/C CADD STANDARD
for Level 2 Designator)

— SHEET TYPE DESIGNATOR

M-201

— SHEET SEQUENCE NUMBER

A/E NAME AND LOCATION INFORMATION

**ADDITIONAL PROJECT INFORMATION
IF NEEDED**

DRAWING TITLE

* PROJECT CODE:
FOR A/E DESIGN PROJECTS
THIS DESIGNATION IS FOUND
IN THE SCOPE OF WORK

**** FILE NUMBER:**
FOR A/E DESIGN PROJECTS THIS NUMBER IS FOUND
IN THE SCOPE OF WORK

* PROJECT CODE:
FOR DESIGN BUILD PROJECTS
THIS DESIGNATION IS FOUND IN THE R.F.P.

**** FILE NUMBER:**
FOR DESIGN BUILD PROJECTS THIS NUMBER IS
FOUND IN THE R.F.P.

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS

DESIGNED BY: X	
DWN BY: X	C X
SUBMITTED BY: X	
FILE NAME: X	
SIZE: X	PLO X

DATE:	X
SOLICITATION I	X
CONTRACT NO.	X
FILE NUMBER:	X
	PLOT DATA

DATE:	X
SOLICITATION NO.:	X
CONTRACT NO.:	X
FILE NUMBER:	X
	PLOT DATE: X

X

X

DESCRIPTION

DATE

↓
X
APPR.

DESCRIPTION

[illegible]

US ARMY CORPS
OF ENGINEERS



RECORD DRAWING

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 81 00

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04/21

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PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 81 00

SUMMARY OF THE WORK

04/21

PART 1 GENERAL

1.1 REFERENCES

The design publications listed below shall be used as sources of criteria for the design. Where a date is not specified, the most current edition of the code or standard in effect, including errata and addenda available at the RFP proposal submission deadline shall be used as criteria for the design. The criteria from these sources may be supplemented but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

AIR FORCE CRITERIA

AF RPA SOF	(2018) Standard Design Air Force Remotely Piloted Aircraft Squadron Operations Facility
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INTELLIGENCE COMMUNITY STANDARD (ICS)

ICD/ICS 705	(2021) Technical Specification for Construction and Management of Sensitive Compartmented Information Facilities
ICS 705-1	(2010) Physical and Technical Security Standard for Sensitive Compartmented Information Facilities

U.S. DEPARTMENT OF DEFENSE (DOD)

DODM 5205.07-V3	(2015; with Change 1, 2015) Special Access Program Security Manual
UFC 1-200-01	(2020; with Change 2, 2022) DoD Building Code
UFC 1-200-02	(2020; with Change 2, 2022) High Performance and Sustainable Building Requirements
UFC 3-101-01	(2020; with Change 1, 2021) Architecture
UFC 3-210-10	(2015; with Change 3, 2020) Low Impact Development
UFC 4-010-06	(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems
UFC 4-010-05	(2013; with Change 2, 2022) Sensitive Compartmented Information Facilities Planning, Design, and Construction

UFC 4-211-01

(2017; with Change 3, 2021) Aircraft
Maintenance Hangars

1.2 DESIGN AND CONSTRUCTION OBJECTIVES

The reonvation of Bldg. 631 and the construction of the communications hut is part of the Disaster Resiliency Program (DRP) Phase 1. Ahangar will also be renovated as part of Phase 1. Additional new construction will be part of Phase 2.

This project also consists of construction of a communications node, also referred to as a communications (comm) hut, and associated sitework. The communications hut will service the rest of the intended construction for Phases 1 and 2.

Bldg. 631 is an unused squadron operations facility that was designed in 1997, and construction was completed in 2000. It is currently occupied but will be vacated by the end of June 2023. Building will be reconfigured into a Formal Training Unit (FTU) with the majority of the interior being demolished. The existing building is two-stories in the center with a small atrium and one story wings on either side.

Category code for this facility is 171211 for Flight Training Classroom. The facility is to have a 25-year useful design life before re-use/re-purpose.

1.3 PROJECT SCOPE

1.3.1 Renovate Bldg. 631

Bldg. 631 is a two-story building consisting of 24,085 GSF on the first floor and 15,866 GSF on the second floor for a total of 39,951 GSF + 1,322 actual SF covered canopies. The building will be essentially gutted and reconfigured for training and the associated administrative spaces.

1.3.2 Communications Hut

The contractor is to provide a communications node/hut, also referred to as a comm hut, to distribute communications to the individual buildings in Phase 1 and Phase 2. Approximate size is 400 square feet. See Concept Drawings, 01 82 00 ARCHITECTURAL REQUIREMENTS and 01 86 29 COMMUNICATIONS REQUIREMENTS for additional information.

1.3.3 Facility Functions

Majority of the Bldg. 631 will be a secure work area (SWA). Boundary (walls, floor/ceilings, roof/ceilings) of the SWA shall be designed and constructed to ICD/ICS 705, ICS 705-1, DODM 5205.07-V3, and UFC 4-010-05. Both sides of the boundary shall be fully inspectable per the criteria. The only portions that will not be in the secured area are the main entry, a locker area for people to put cell phones, backpacks, and other personal items that are not allowed in the secured area, a transition/landing zone for visitors who are waiting for security clearance into the main facility, and a heritage room for unclassified gatherings and meetings. The entire facility will be secured with one entrance. All other doors will be exit only or allowed entrance by interior card-enabled access.

The customer has precise requirements for the simulator (SIM) rooms and

the associated server rooms. See Appendix Anywhere Room Data Sheets indicate "hard dimensions", these dimensions are from wall finish to wall finish and must be that exact size. The majority of the north, first floor portion of the building is to be on 18" raised access flooring (RAF).

The Concept Drawings and Room Data Sheets, both attached as appendices, have been developed using UFC 4-211-01 and the Standard Design Air Force Remotely Piloted Aircraft Squadron Operations Facility. As the building is existing and some of the functions and/or spaces do not correspond to these standards, the design and construction shall continue to use these standards for guidance as applicable.

1.3.4 Site and Infrastructure Functions

See the Concept Drawings and 01 89 00 SITE WORK REQUIREMENTS for additional information.

1.3.5 Project Site

The project is located at Grand Forks Air Force Base (AFB) near the airfield. Vicinity and location maps can be found in the drawings provided with the Concept Drawings.

1.3.6 Base Bid and Bid Options

1.3.6.1 Base Bid

The base bid includes the design of the entire project and construction of the comm hut as described in all sections of these specifications, appendices, and drawings.

1.3.6.2 Bid Options

Bid Options are summarized here. See discipline specific requirements sections, Room Data Sheets, and drawings for additional information.

1.3.6.2.1 Bid Option - Furniture, Fixtures, and Equipment (FF&E)

See Interiors Furniture Plans on the Concept Drawings and Section 01 84 00 INTERIOR DESIGN REQUIREMENTS.

1.4 DESIGN AND CONSTRUCTION REQUIREMENTS

1.4.1 Changes to RFP Criteria Requirements

This Request for Proposal provides requirements expected of the Design-Build Contractor during the design and construction of this project.

The RFP bridging documents present an overall design concept of the project; provide useful project information; establish some definition of the systems to be used; and incorporate requirements expected by the Using Service.

It shall be the responsibility of the Design-Build Contractor to assemble the best-value-priced construction systems for this project that meet or exceed the design criteria set forth herein.

Offerors should not consider changes to RFP criteria requirements during proposal preparation. After contract award, any changes to the RFP

criteria requirements require approval by the Contracting Officer.

See Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES for additional requirements.

1.4.2 Codes and Criteria

All pertinent building codes, life safety codes, and reference criteria shall be met or exceeded. This project utilizes the DoD Building Code, as defined by UFC 1-200-01 and its references.

If there is a conflict in requirements, order of precedence shall be as follows, in order of decreasing precedence:

- a. Life Safety, as defined by DoD Building Code UFC 1-200-01 and its references
- b. ICD/ICS 705 Requirements
- c. RFP Specifications
- d. RFP Drawings
- e. Non-life safety criteria, as defined by DoD Building Code UFC 1-200-01 and its references
- e. Other criteria as listed herein

1.4.3 Phasing of Work, Security, and Construction Staging

The Contractor shall maintain a secured area for storage of materials. The Contractor shall maintain a site access route and may utilize an outdoor storage yard and construction trailer. See Section 01 89 00 SITE WORK REQUIREMENTS for additional information. See drawings for outdoor construction staging areas. Construction contractor shall maintain a construction area fence during construction.

Secured work areas shall be designed and constructed to ICD/ICS 705, ICS 705-1, and UFC 4-010-05.

1.4.4 Sustainability

1.4.4.1 Criteria

This project shall at a minimum incorporate high performance and sustainable site and building features as listed in UFC 1-200-02 HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS, UFC 3-210-10 LOW IMPACT DEVELOPMENT, and UFC 3-101-01 ARCHITECTURE as applicable to the project scope.

1.4.4.2 Total Building Commissioning

Apply total building commissioning principles and fully commission the facility, in compliance with Section 01 91 00.15 TOTAL BUILDING COMMISSIONING and UFC 1-200-02.

1.4.4.3 Cybersecurity

Provide cybersecurity in accordance with specification 01 35 13 INDUSTRIAL CONTROL SYSTEMS PROCUREMENT for all systems that meet the definition of an industrial control system (ICS), SCADA or facility related control system (FRCS)

1.4.4.4 Third Party Certification/Validation

Third Party Certification indicated in the UFC is required for the project. However, the contractor shall update the preliminary Air Force Sustainability Requirements Score Sheet (see appendix) to track and report project compliance status at all design/construction submittals. The contractor shall provide updated copies of the document as deliverables for each design phase, as well as constantly update the document throughout construction, available for viewing on request. Provide a final updated document as a project closeout deliverable. This facility meets applicability requirements for use of UFC 1-200-02, HPSB for third party validation of Guiding Principles and air barrier requirements as indicated in UFC 3-101-01, Architecture. The contractor shall design and construct a project that is 100% compliant with UFC 1-200-02 and Guiding Principles, demonstrated by receiving a "Certificate of Compliance" thru USGBC/GBCI or GBI.

Included with this RFP is a preliminary Air Force Sustainability Requirements Scoresheet for this project. The contractor shall complete, maintain and update the Scoresheet, and have the Scoresheet available at any time for auditing and Air Force reporting. At project completion, the Scoresheet should be completely filled out with only "Yes" and "N/A" indicated in the Compliance column. All N/A responses must have justification included. See 01 33 29 SUSTAINABILITY REPORTING for additional requirements.

1.4.5 Bridging Documents

Conceptual drawings of the site plans, floor plans, and elevations are included for use in developing this design. For information only as-built drawings are included as an appendix. Room data sheets with minimum space and space-type requirements have also been attached as an appendix.

1.4.6 Design and Construction Measurement Units

Design, products, and construction for the project shall be accomplished using English units of measurement. All measurement in the technical specifications sections shall be shown in English.

1.4.7 Personnel Qualifications and Experience

Design and construction personnel qualifications and experience shall be per the requirements of Section 00 22 00 PROPOSAL INSTRUCTIONS, SUBMISSION REQUIREMENTS, EVALUATION CRITERIA AND BASIS OF AWARD and Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES.

1.4.8 Design and Construction Deliverables

See Section 01 33 00.32, DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES.

1.4.9 Advanced Modeling and Facility Data Requirements

The contractor shall design and construct this project by leveraging BIM, CIM and electronic facility data to the greatest extent practical under the scope of this project. See 01 33 39.00 10 ADVANCED MODELING (BIM/CIM/GIS/CAD) REQUIREMENTS for minimum project requirements. This project also requires the development and turnover of electronic facility data (via a Facility Data Workbook (FDW)) to the Government. See 01 78 24.00 10 FACILITY DATA REQUIREMENTS (BUILDER).

1.4.10 Operations and Maintenance Requirements

See Section 01 78 23 OPERATION AND MAINTENANCE DATA for requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

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ARCHITECTURAL REQUIREMENTS

04/21

PART 1 GENERAL

1.1 REFERENCES

The design publications listed below shall be used as sources of criteria for the architectural design. Where a date is not specified, the most current edition of the code or standard in effect, including errata and addenda available at the RFP proposal submission deadline shall be used as criteria for the design. The criteria from these sources may be supplemented but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2017) Specifications for Standard Steel Doors and Frames
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U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01	(2019; with Change 1, 2020) DoD Building Code
UFC 1-200-02	(2020) High Performance and Sustainable Building Requirements
UFC 3-101-01	(2020; with Change 1, 2021) Architecture
UFC 3-110-03	(2012; with Change 5, 2020) Roofing
UFC 3-120-01	(2014; with Change 3, 2017) Design: Sign Standard
UFC 3-600-01	(2016; with Change 5, 2020) Fire Protection Engineering for Facilities
UFC 4-010-01	(2018; with Change 1, 2020) DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-05	(2013; with Change 2, 2022) Sensitive Compartmented Information Facilities Planning, Design, and Construction
DoD ABA Memorandum	(2008) Dod Memorandum - Access for People

with Disabilities

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP (2019) Energy Standard for Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM E1514 (1998; R 2017) Standard Specification for Structural Standing Seam Steel Roof Panel Systems

ASTM E84 (2018a) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E1264 (2014) Acoustical Ceiling Products

FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide
<http://www.approvalguide.com/>

INTELLIGENCE COMMUNITY STANDARD (ICS)

ICD/ICS 705 (2021) Technical Specification for Construction and Management of Sensitive Compartmented Information Facilities

ICS 705-1 (2010) Physical and Technical Security Standard for Sensitive Compartmented Information Facilities

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2021) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2018; ERTA 1-2 2018) Standard for Portable Fire Extinguishers

NFPA 101 (2021) Life Safety Code

NFPA 252 (2017) Standard Methods of Fire Tests of Door Assemblies

NFPA 80 (2019) Standard for Fire Doors and Other Opening Protectives

NFPA 286 (2019) Standard Methods of Fire Tests for Evaluating Contribution of Wall and

Ceiling Interior Finish to Room Fire Growth
UNDERWRITERS LABORATORIES (UL)

UL 10C (2016) UL Standard for Safety Positive
Pressure Fire Tests of Door Assemblies

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED BDC Ref Guide (2020) USGBC LEED Reference Guide for
Building Design and Construction, v4.1

1.2 GENERAL DESIGN REQUIREMENTS

1.2.1 Applicable Codes and Criteria

All pertinent building codes, life safety codes, and reference criteria shall be met or exceeded. This project utilizes the DoD Building Code, as defined by UFC 1-200-01 and its references.

1.2.2 Technical Specifications

Government-provided technical guide specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the selected products and installation requirements for this project

Certain specifications and performance requirements, deemed critical to the project, have been included herein. Where requirements are not covered in the guide specifications, specification sections shall be prepared to cover those subjects and shall be in the same format as the guide specifications.

1.2.3 Handicapped Accessibility

Per DoD ABA Memorandum, "It is the goal of the Department of Defense (DoD) to make its facilities accessible to persons with disabilities. To achieve that goal, the Department intends to go beyond the minimum requirements of law. Even if a facility is exempt from coverage under the Architectural Barriers Act of 1968 (ABA), compliance with the standards identified in this memorandum is recommended to the maximum extent that is reasonable and practicable without degrading the facility's military utility."

The facility, excluding mechanical, electrical, and telecommunication equipment rooms, and site access to the building must be designed and constructed to be accessible in accordance with the Architectural Barriers Act (36 CFR 1191). Ramps, including ramps to telecom/server rooms, shall be constructed to a maximum slope of 1:12. Exterior ramps shall be constructed of concrete with foundations (not open under the ramp). Modular, portable, or metal ramps will not be permitted for the exterior ramps. All ramps shall meet ABA compliance and shall join exit sidewalks for compliance with NFPA 101 whether or not specifically required by the referenced documents. Access to the server rooms shall be similar to ABA requirements with curb cuts, ramps, etc. to facilitate rolling of equipment from a truck to the ramp and into the building so that personnel do not have to lift dollies or equipment over curbs and other obstructions. Use of existing curb ramps shall be permitted to achieve accessibility as long as the ramps occur in a convenient and usable configuration.

Interior ramps can be either of concrete, raised access flooring, or other means that complies with UFC 1-200-01 and referenced codes. Design intent is that the intermediate landing of the ramp will be at the same level as two riser heights of southern stairwell Stair 1. Total height of both interior ramps shall be 18-inches to accommodate the raised access flooring.

The Mass Briefing Room does not currently meet ABA standards. As such an area for handicapped seating and access to the stage shall be provided. Seating on the first row shall be removed to allow for more flexible seating. A lift shall be provided for the stage. Lift installation shall include partial removal of the stage. Design shall include selection of a lift that is as unobtrusive as possible to the stage and shall have removable guardrails. Lift shall be a permanent installation, not a movable lift.

1.2.4 Occupational Safety and Health

Building design shall comply with 29 CFR 1910 Occupational Safety and Health Standards (OSHA) criteria for all items which must be included in the design to ensure safety compliance.

1.2.5 Antiterrorism/Force Protection

This building shall include design provisions meeting the requirements of UFC 4-010-01 - DoD Minimum Antiterrorism Standards for Buildings. This includes, but is not limited to, minimum setbacks from parking areas and access drives, glazing and blast resistance requirements; visual screening; HVAC intake louver locations; and other protective features as outlined in the UFC. See Concept Drawings and 01 89 00 SITE WORK REQUIREMENTS for requirements on eliminating the existing driveway to the front entrance and other requirements.

1.2.6 Fire Protection and Life Safety

Fire separation walls and egress from the facility shall meet or exceed the requirements of NFPA 101 - Life Safety Code. The facility shall be protected by an automatic fire sprinkler system throughout the building. See Section 01 86 13 FIRE PROTECTION REQUIREMENTS as well as UFC 3-600-01 Fire Protection Engineering for Facilities.

Provide facility with semi-recessed fire extinguisher cabinets and brackets where required and complying with UFC 3-600-01, NFPA 10 and NFPA 101. Provide brackets in utility spaces, and provide wall-mounted cabinets on walls that are a part of the secured boundary or on STC rated walls.

Fire extinguishers for each bracket and cabinet are included in the base bid.

1.3 TYPE AND METHOD OF CONSTRUCTION

This facility is existing, permanent construction and shall be redesigned and renovated as permanent construction. The definition of permanent construction is, "Facilities designed and constructed to serve a life expectancy of more than 25 years, should be energy efficient, and must have finishes, materials, and systems selected for low maintenance and low life-cycle cost." Reference UFC 1-200-02 for additional design criteria.

The overall building occupancy classification for the facility is defined in Section 01 86 13 FIRE PROTECTION REQUIREMENTS. Construction "Type IIB" shall be used for the facility. Provide fire protection, separation, and life safety features as necessary for the occupancy and type of construction listed.

1.4 FUNCTIONAL BUILDING REQUIREMENTS

1.4.1 Space and Square Footage Allocation

The building spaces shall be arranged as shown on the drawings provided in this RFP. This arrangement has been arrived at after multiple meetings with the end user and has been determined as the best way to meet the functional needs of the client, in addition to meeting necessary code requirements. However, other design solutions which slightly modify the provided solutions may be acceptable, and will be reviewed on their design merits against the furnished criteria. Any changes to the floor plan must be approved by the Corps of Engineers Omaha District Design Branch Architectural Section and the contracting officer.

The gross square footage of the facility is 39,861 SF. Interior net square footage shown on plans is approximate and will vary from what is shown based on thickness of walls, location of furring, needs for mechanical/plumbing chases, etc. New wall locations are somewhat flexible, with adjustments being made as necessary to meet space functional requirements, structural requirements, and ICD/ICS 705 requirements for constructability. Rooms noted on the Room Data Sheets with specific/hard dimensions are not flexible. The layout of the mechanical, electrical, and telecommunications spaces (rooms, allocated floor and wall spaces, and chases) are suggestive and may require wall and ceiling configurations to be slightly altered to conform to equipment requirements.

1.4.2 Demolition Requirements

1.4.2.1 Walls

Majority of the interior walls are intended to be demolished and are as indicated on the AD sheets in the concept drawings package. Walls intended to remain may be required to have drywall and other appurtenances removed as required to accommodate the new layout, fire ratings, and STC requirements.

1.4.2.2 Secured Boundary

Existing walls, floors, ceilings, and roof that form the new secured boundary shall have all conduit, wiring, fire alarms, and other appurtenances removed. Boundary walls and ceilings shall have all gypsum wall board and batt insulation removed.

1.4.2.3 Windows

All interior windows, transoms, and sidelites shall be removed. All glassblock is to be removed except for the glassblock in the railing on the atrium. Exterior windows shall be removed as shown on the concept drawings.

Existing, exterior windows to remain shall have the glass removed and replaced with black, spandrel panels. Resulting construction shall meet

ICD/ICS 705 requirements. Windows in the atrium on the second floor do not need to be replaced with metal panels as the corridor is intended to be a non-discussion area but do need to be equipped with IDS/glass breaks.

1.4.2.4 Doors

All exterior and interior personnel doors are to be removed whether or not indicated on the AD sheets. If new doors that are to remain in the same location as the removed doors, new door hardware aligns with the existing door frames, and the frames are in good condition, then the frames can remain in place.

Exterior sectional and roll-up doors shall be removed.

1.4.2.5 Restrooms and Lockers

All plumbing fixtures, toilet/urinal partitions, countertops, toilet accessories (i.e. soap, papertowel, toilet tissue, etc. dispensers), lockers, and benches shall be removed. See concept drawings for new layouts.

1.4.2.6 Finishes

All existing floor finishes, wall base, wall covering/paneling, wall tile, corridor railings, acoustical treatments, and acoustical ceiling tile and suspension systems shall be removed. Existing gypsum ceiling and wallboard can remain in place provided it is in good condition, meets the intended use, and can be verified that it meets the new requirements for water resistance, fire, and STC ratings.

1.4.3 New Construction and Renovation Requirements

Construct new layout as shown. See Room Data Sheets, specifications, and Concept Drawings for additional information.

1.4.3.1 Desired Image and Architectural Compatibility

Renovated exterior shall be similar to existing and shall be compatible with Bldg. 629 to the north.

1.4.3.2 Secured Boundary

The secured boundary including exterior and interior walls as shown on the drawings shall meet ICD/ICS 705 Standards. The entire roof forms part of the secured boundary and is required to be STC-50. If existing roof system does not meet the STC-50 requirement, then it must be enhanced to meet STC-50 requirements. The exterior walls are expected to have the wallboard removed, existing electrical and comm removed, and insulation removed. New materials will be installed to meet ICD/ICS 705 requirements.

Floors and ceilings that form the secured boundary and abut an unsecured area shall be modified to meet the same ICD/ICS boundary standards, including meeting STC-50 requirements. Penetrations of the secured boundary shall be kept to a minimum. All other locations shall flush mount receptacles and drops. Depending on wall type and security design the contractor shall fur walls where necessary to avoid compromising the integrity or performance of the secured boundary.

Walls and ceilings that form part of the SWA boundary shall be inspectable

on both sides. No electrical items (i.e. outlets, junction boxes, switches, conduit, etc.) shall not be part of the boundary walls. Electrical items shall be provided for in furring over the boundary wall. Electrical items in the JUA Comm room, and the SIM (OA) Server rooms, and Mechanical Rooms can be surface mounted without furring. Secured communication lines and boxes shall be surface mounted through the Bldg. 631. The walls of SWA walls shall be finished the same from the floor deck to the ceiling/floor deck or roof deck.

1.4.3.3 Antenna Platform

Provide a 20' x 20' x 20' high expanded or perforated metal platform for mounting all antennas as described in ICD Annex A. Access shall be via stairs in the center of the platform. Stairs shall have a lockable gate and be protected with steel mesh, expanded metal, or other permanent means to prevent intrusion. Platform shall have guardrails and stairs shall have handrails. A metal shall be primed and painted.

1.4.3.4 Exterior Envelope

Reference as-builts and concept drawings for envelope materials. Both are provided as appendices.

Any items, such as windows, doors, louvers, etc., removed on the exterior walls shall be filled in to match the existing construction. Louvers and any openings shall maintain the secured boundary integrity meeting the requirements of ICD 705. Any new metal panels required for the roof or walls shall match the profile and color of the existing metal panels. Any infill of walls shall be repaired and refinished, so that the new elevations does not appear as a series of patches, but rather as a cohesive whole. Provide EIFS repair mesh between the existing and new construction and at any existing cracks, overlapping the mesh as required by the manufacturer.

1.4.3.5 Room Finishes

See Room Data Sheets and Section 01 84 00 INTERIOR DESIGN REQUIREMENTS.

1.4.3.6 Sound and Vibration Control

Walls and ceilings shall be designed and constructed to impede transmission of equipment vibrations and other noises between rooms and within a room. Wall construction in this facility shall be insulated or isolated to the minimum levels as defined by the room data sheets and as shown on the concept drawings. When spaces with differing values abut one another, the more stringent value shall govern.

Where not otherwise defined, walls separating individual spaces in this project shall be constructed to comply with UFC 3-101-01 Chapter 4.. Interior "stub" walls or other walls that do not serve as a means of physically enclosing a space need not be insulated. Walls that are rated STC 42 or higher shall extend to structural deck above.

Rooms on the first floor noted to be STC-50 shall have the ceiling/floor above them also STC-50 rated. Rooms on the second floor that are to be STC-50 or are above areas not designated as part of the secured boundary shall meet STC-50 criteria so that a continuous boundary for the STC rated rooms are formed.

1.4.3.7 Security and Access Control

The majority of the facility will be considered a Secured Work Area (SWA). As such the entire facility will be secured with one entrance. All other personnel doors will be exit only. All doors that are a part of the secured boundary shall meet ICD/ICS 705 and ICS 705-1.

Boundaries of the secured area are noted on the Concept Drawings. All penetrations of the boundary shall be dielectric breaks or non-conductive material in compliance with ICD/ICS 705 and ICS 705-1. Boundaries shall be inspectable on both sides. The main corridors, stairways, restrooms, and break areas are to be considered non-discussion areas.

Provide a knox box at the primary building entrance for fire department access.

1.4.3.8 Sustainability and Energy Performance

1.4.3.8.1 Air Barrier

The existing facility shall be inspected for gaps in the exterior, especially at the roof to wall connections, and an air barrier shall be designed and installed to seal penetrations, holes, etc. in order to improve the air barrier system. Any holes in the exterior walls or controlled boundary walls, ceilings, or floors shall be filled. New, exterior infill and furring walls shall be designed to be airtight. Testing of the air barrier is required. Testing shall follow the requirements in UFC 1-200-02 and UFC 3-101-01. Air barrier specifications Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS are to be edited by the contractor. On design drawings, indicate air barrier limits and provide detail drawings and specifications for construction. Mechanical rooms are exempt from testing. All other areas shall be segregated and constructed for required air barrier construction with full blower door testing.

1.4.3.8.2 Building Envelope Energy Performance

The contractor shall meet the minimum building envelope energy performance values of ASHRAE 90.1 - IP. The contractor shall insulate the building as needed to meet these values. The contractor shall also meet the minimum energy reduction requirements as listed in Federal mandates, as outlined in UFC 1-200-02.

1.4.3.8.3 Daylighting

Daylighting is generally not required in this facility due to the SWA requirements. Existing windows as part of the controlled boundary shall be removed or blocked as a minimum to meet the secured boundary requirements as described elsewhere in this RFP and the associated bridging documents.

The only areas for daylighting are in the areas outside of the secured boundary, i.e. the Transition/Landing Zone and the Heritage room. In addition, the existing atrium clerestory windows shall remain as that corridor is a non-discussion area. The opening to the first floor of the atrium shall be filled with laminated glazing to allow daylighting to the main corridor on the first floor. Fire rating requirements shall be maintained.

1.4.3.8.4 Total Building Commissioning

Apply total building commissioning principles and fully commission the facility, in compliance with Section 01 91 00.15 TOTAL BUILDING COMMISSIONING and UFC 1-200-02.

PART 2 PRODUCTS

2.1 MATERIAL SELECTION CRITERIA

Material selections shall be based upon reducing operation and maintenance costs. All materials shall be easy to clean and resist soiling.

2.2 BUILDING CONSTRUCTION

The building is constructed of structural steel columns and beams and steel joists. The first floor is a slab on grade with concrete footings while the second floor is concrete on steel deck. The roofs are gable pitched with metal roofing on steel joists. Exterior walls consist of structural steel columns and steel bracing, 6" 16 gage steel studs at 16" on center with 6" batt insulation (R-19), 1/2" exterior gypsum wallboard, and R-10 exterior insulated finish system (EIFS). The interior side of the exterior walls have 5/8" gypsum wall board on 2-1/2" 16 gage metal studs at 16" on center, and a vapor barrier. See as-builts for detailed information.

2.3 ROOFS

2.3.1 Existing Roof

Existing roofing is standing seam metal roofing. Any new roofing required to fill removed equipment or other items shall match existing construction.

Gutters and downspouts shall be removed, designed, sized, and installed according to current standards.

The entire roof other than entry canopies forms the secured boundary. Any penetrations through the roof that are a part of the secured boundary shall be protected in accordance with ICD/ICS 705, ICS 705-1, and UFC 4-010-05.

2.4 DOORS AND FRAMES

2.4.1 Exterior Doors

All doors in the controlled boundary areas shall comply with the applicable criteria including but not limited to provisions for forced entry, security pins, required thickness, alarming, and STC rating per ICD/ICS 705, ICS 705-1, and UFC 4-010-05. All exterior doors shall be equipped with panic hardware.

2.4.1.1 Exterior Hollow Metal Doors

All exterior doors not otherwise designated shall be insulated hollow metal and minimum Level 2 performance Level B per SDI/DOOR A250.8. All door frames shall be welded. No knock-down frames shall be allowed. Reuse of existing door frames where doors are to be replaced is acceptable if the door frames are in good condition and are capable of receiving the new

door hinges, latch, etc. of the new door. Minimum thickness for hollow metal doors shall be 1-3/4 inches. Door frames not located under protective overhangs shall have continuous overhead rain drips for the full length of the door opening. Minimum thickness of the steel shall be 18 gauge. All doors shall include aluminum thresholds and aluminum housed weather seals. Doors to the SIM Servers and Comm Room shall have kickplates on both sides of the door.

Exterior doors and frames shall receive a painted finish. Exterior doors shall exceed minimum insulation required in ASHRAE 90.1 - IP. Door frames shall be filled with spray foam insulation. Exterior doors and frames shall comply with UFC 4-010-01.

2.4.1.2 Storefront Doors

Provide doors with hardware and finishes compatible with storefront requirements listed above. Doors in storefronts shall be fully-glazed.

2.4.1.3 Thresholds

All exterior door shall have thresholds which shall be thermally broken.

2.4.2 Interior Doors

Interior doors shall be solid core wood veneer unless other requirements dictate otherwise. Doors shall be factory stained and finished and factory prepared for door hardware. All doors shall be 3'-0" x 7'-0" unless otherwise note. Some doors are required to be 4'-0" wide in order to accommodate equipment. 4'-0" wide doors that are required to meet ABA but do not meet the clearance requirements due to location of walls shall have a 3'-0" leaf and a 1'-0" leaf. the 1'-0" leaf shall be secured in place with flush bolts for standard usage.

Existing door frames that are where doors are to be replaced can be reused provided that they are in good condition and will receive the new door hinges, latch, etc. of the new door. Door frames shall be welded hollow metal type. Knock-down frames are not allowed. All new and existing frames shall be painted.

Door frames shall be located at a minimum four inches away from perpendicular walls.

2.4.3 Acoustic Rated Doors

Doors noted to be STC-50 on the Room Data Sheets, form part of the secured boundary, or are in STC-50 rated walls shall be a complete fully tested "assembly" including door, frame, gasketing, threshold, etc. of a single manufacturer, and certified to achieve an STC-50 rating. Doors that are located in STC-45 walls shall be STC-35 or greater and shall have sound seals.

2.4.4 Fire Doors

Doors shall comply with NFPA 80. Doors to have a fire resistance rating shall conforming to the requirements of UL 10C or NFPA 252 for the class of door required. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

2.4.5 Hardware

Provide door hardware in type and configuration appropriate for the spaces being served. Provide panic hardware on all doors serving the primary building circulation system including all building exits, all exterior doors, and all doors that separate building circulation spaces and corridors. Use lever handles per ABA for doors that do not have panic hardware. All hardware shall comply with ANSI/BHMA standards for heavy use. Provide non-removable security pins on door hinges in exterior building perimeter and as required by referenced criteria. Finish for hardware shall be consistent throughout the facility when practical. Provide brushed stainless steel or satin nickel finish on exposed hardware.

For restrooms, provide a keyed dead bolt lock on the doors so that the restroom can be closed off for maintenance.

Door stops are required at all interior and exterior locations. Stops can be floor mounted, wall mounted, or closer stops as best suits the location and type of door.

All coordination of doors and door hardware is the responsibility of the construction contractor.

2.4.5.1 Door Closers

Automatic door closers shall be used on exterior doors, fire doors, and restroom doors. Provide fusible links on applicable fire rated doors with hold-open device as indicated on Concept Drawings.

2.4.5.2 Keyed Access Entry Control Systems

Provide cylinders and cores for all new keyed locksets. Provide cylinders compatible with base core requirements. To meet the Grand Forks AFB master key plan, provide all keyed locksets with Best Lock Corporation or ASSA ABLOY Corporation Small Format Interchangeable Cores (SFIC), which are removable by a special control key. Factory set the cores with seven pin tumblers using the BEST or MEDECO Keymark x4 patented keyways. Provide master keyed cores in one system for this project. The contractor shall validate functionality of all keys for the respective core including the master key(s). Coordinate additional core requirements with Base CES, the O&M contractor locksmith and Installation Physical Security through the KO.

Contractor shall provide temporary construction cores, replaceable by permanent cores. Permanent cylinders/cores shall be forwarded to the Base lock shop, separately from key, by means as directed by the KO. Contractor shall replace construction cores with permanent cores as directed by KO. Installation will be in the presence of the COR.

Existing exterior mechanical room doors shall remain as is. Access to mechanical and electrical rooms shall be limited to authorized personnel through lockable doors. These rooms shall be keyed independently from the building master system for access by installation maintenance personnel. The Unclassified Communication Room doors shall be on a different core than other electrical and mechanical areas. The contractor shall coordinate with Base CES to ensure that key systems match existing base keying systems for these type of spaces.

All cores shall include four keys for each interior doors and five keys for each exterior doors and with two master keys for each KNOX box placed

at the building location. Furnish a quantity of key blanks equal to 20-percent of the total number of file keys. Stamp all keys with "U.S. GOVERNMENT DO NOT DUPLICATE". In addition, stamp the keys and cores with the core number. Do not place room number on keys. Turn over all master keys provided to the Grand Forks AFB O&M locksmith for security control through the Contracting Officer's Representative (COR). Inventory and turn over all other keys to the Government for issue to the building occupants through the COR. Provide a key cabinet and control system for all facility keys, including a floor plan cross referenced to all key locations. Coordinate cabinet mounting location with Contracting Officer.

2.4.5.3 Keyless Access

Provide keyless entry control hardware and infrastructure. Keyless access shall be installed at locations as indicated on the concept drawings and in the room data sheets as designated to have card readers. Doors shall have card readers with PIN unless otherwise specified elsewhere. Provide electrified mortise locks with integrated request to exit (REX) function for doors that have card readers. Base is currently using Vindicator and Advantior keyless access systems.

Infrastructure shall extend from the required locations to a secure server rack in the facility telecom rooms. See 01 86 26 ELECTRICAL REQUIREMENTS for detailed requirements. Accommodations shall be made for associated low voltage and communications lines.

2.5 STOREFRONTS

New storefront windows shall be provided in the general size, color, materials, and configuration to match existing as indicated in the bridging documents. Glazing units shall be low-E, and insulated with a U-value (Winter nighttime) of 0.29 or lower. Frames shall be thermally broken aluminum. Storefronts shall comply with applicable portions of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings.

2.6 INTERIORS

2.6.1 Secured Boundary Perimeters

Where walls and/or ceilings are part of secured boundary or designated to be ICD/ICS 705 compliant shall comply with ICD/ICS 705, ICS 705-1, and UFC 4-010-05. Treat all penetrations per the appropriate criteria.

Contractor may provide conduits, junction boxes, and light switches in the secured boundary wall. Data/telecom and cabling shall be surface-mounted on all walls, secured boundary or not. Plumbing shall not be installed on secured boundary walls.

New walls shall be installed in a manner compliant with secured boundary requirements for perimeter wall inspection on both sides. Existing walls that are to be a part of the secured boundary shall be made compliant. Walls that occur on the secured boundary shall be installed from structural floor to structural deck, with substrate (such as drywall level of finish, etc.) and finishes installed continuously from structural floor to structural deck to allow for ease of inspection and identification of tampering.

Structural decks that enclose a boundary wall but are not a part of the roof shall be made compliant with the applicable boundary requirements.

See UFC 4-010-05 for requirements relating to finishing and sealing of secured boundary walls.

2.6.2 Gypsum Board Assemblies

All gypsum wall board shall be 5/8" thick minimum. Provide fire-resistant gypsum board where required to achieve fire-ratings. Provide impact resistant gypsum board from top of slab to a minimum of 4 feet above finished floor in corridors. Provide glass-mat gypsum board on walls of all toilet and shower rooms. Provide water-resistant gypsum board on all plumbing walls. Pre-decorated gypsum board panels and trim system or similar type products and assemblies are not permitted.

Interior partitions requiring physical security, fire ratings, and/or sound ratings shall be designed and constructed in accordance with manufacturers' approved, tested system designs. These partitions shall extend to the underside of the structural ceiling and shall be sealed to maintain security, fire rating, and/or sound rating unless otherwise identified in the bridging documents.

All interior walls shall be insulated with a minimum of 3" fiberglass batt or mineral wool insulation. Walls not required to go to the structural deck can terminate 12 inches above the finish ceiling. Interior "stub" walls or other walls that do not serve as a means of physically enclosing a space need not be insulated.

Gypsum board shall be finished per UFGS 09 29 00 and shall be finished to a Level IV finish.

2.6.3 Gypsum Board Ceilings

Gypsum board in toilet rooms, showers, and janitor's closets shall be water/mold-resistant. Fire-resistant gypsum board shall be utilized where required to achieve fire-rating.

2.6.4 Acoustical Ceiling Tiles

Provide acoustical ceiling tiles in the locations identified in the bridging documents. Tiles shall be 24-inch by 24-inch panels on a medium duty suspension system. Ceiling tiles shall have a Noise Reduction Coefficient (NRC) of 0.75 or higher, have a light reflectance of 0.8 or higher, have an Articulation Class (AC) of 180 or higher, and be sag resistant. Ceiling tiles shall have a "E" pattern designation, "lightly textured" per ASTM E1264. Ceiling tiles shall have tegular edges. Sprinkler heads, smoke detectors, speakers, and other ceiling fixtures should be installed centered on the ceiling tile.

2.6.5 Exposed Structural Ceilings

See Room Data Sheets for exposed structural ceiling finish. Paint exposed structural ceilings

2.6.6 Insulation

Do not expose insulation on interior wall surfaces. Where pipe insulation is exposed in maintenance areas, use insulation jackets of durable, protective fabric in accordance with the applicable criteria.

Use the most appropriate type of insulation for its intended function and

install location. Batts, mineral fibers, spray foams, rigid, etc. are all acceptable as long as they are installed per manufacturer instructions and meet applicable code and criteria thresholds.

2.6.7 Raised Access Flooring (RAF)

Provide RAF system in the Operations Area (OA) and the Joint Use Area (JUA) and as noted in the room data sheets (majority of the first floor, north end of Bldg. 631). The RAF section shall consist of modular and removable cementitious filled, welded all-steel panels supported on all four edges by structural steel members that are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern. The raised access flooring shall have a minimum weight load of 250 PSF to support racks and simulators. Raised floor system shall not utilize crossbracing to resist lateral loads. Crossbracing interferes with the cable tray runs. Panels shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions. Finishes shall be permanently attached by access floor manufacturer. RAF shall have integrated cable trays. The RAF depth will be 18". See drawings for locations and quantity of interior ramps and steps to accommodate the grade change.

2.7 ACCESS DOORS AND PANELS

Access doors and panels shall be flush type. Frames for access doors shall be fabricated of not lighter than 16-gauge steel with welded joints and finished with anchorage for securing into construction. Access doors shall be a minimum of 14-inches by 20-inches and of not lighter than 14-gauge steel, with stiffened edges, complete with attachments. Access doors shall be hinged to frame and provided with a flush face and a screwdriver operated latch. Exposed metal surfaces shall have a shop applied prime coat. Finished paint coat shall match surrounding surfaces. Panel shall be installed in uninhabited rooms (i.e., closets) and/or non-conspicuous locations. Panels shall be installed at all locations requiring access to plumbing, mechanical and electrical controls, and as required for inspection of Controlled Area perimeter.

2.8 Elevator

The elevator's cab interior finishes shall be removed and replaced. Flooring shall match adjacent corridor. Walls shall be laminate. New hand rails shall be installed. Ceiling and lighting shall be replaced with new.

2.9 BUILDING EXPANSION JOINTS

Existing expansion joints location shall remain and be continued through any new construction. Contractor can keep the existing in place if in good condition or shall replace and/or install with comparable material to accommodate the required expansion.

2.10 INTERIOR SEALANT

Provide sealant complying with ASTM C 834.

For interior traffic joints in horizontal surfaces, low VOC sealant shall comply with ASTM C 920, Type C, S, or M, Grade P, Class 25, Use T.

For interior locations subject to moisture, sealant shall be Low VOC silicone complying with ASTM C 920, Type S, Grade NS, Class 25, and with

ANSI A 108.1 for mold growth.

Use acoustical sealant at joints, perimeter edge conditions and penetrations for all sound-rated partitions and ceilings. Sealant shall be a low VOC rubber- or polymer-based acoustical sealant conforming to ASTM C 919, and shall have a flame spread of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84. Acoustical sealant must have a consistency of 250-310, when tested in accordance with ASTM C 919, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and must be non-staining.

Use firestop or smoke-stop sealant at all partitions with fire or smoke ratings.

2.11 CABINETRY AND CASEWORK

Provide casework in the basic locations, configuration, and designed to accommodate the equipment and fixtures as shown in the RFP documents.

Provide base and wall cabinets in indicated locations, unless noted otherwise. All casework shall be laminate clad.

Unless otherwise noted on the drawings, all materials, construction methods, fabrication, and install shall conform to and comply with the "custom" grade quality standards as outlined in AWI AWS, Section for laminate clad cabinets. Cabinet style, in accordance with AWI AWS, Section 400-G descriptions, shall be reveal overlay.

Provide solid surface countertops for restroom lavatories and break room countertops and as per 01 84 00 INTERIOR DESIGN REQUIREMENTS.

2.12 INFORMATION SPECIALTIES

2.12.1 Bulletin Boards/Tackboards

Provide tackboards in quantity, sizes, and general locations identified in the bridging documents.

2.12.2 Wall-mount Television and Monitor Bracket

Provide universal, horizontal-sliding, vertical-tilt, wall-mount television brackets as identified on the concept drawings or as listed in the Room Data Sheets for wall-mounted monitors. Brackets shall be capable of accepting a wide-array of flat panel televisions or flat panel commercial monitors. Bracket shall be able to accommodate screen sizes ranging from 32 inches to 90 inches and up to 150 pounds in weight. Bracket shall be capable of horizontal adjustments of 2" in each direction and tilting of 10 degrees in the vertical direction.

Provide universal horizontal-sliding, vertical-tilt, wall-mount monitor/television brackets as identified in the RFP documents. Brackets shall be capable of accepting a wide array of LCD, LED or plasma type flat panel monitors/televisions. Bracket shall be capable of accepting a wide-array of flat panel televisions or flat panel commercial monitors. Bracket shall be able to accommodate screen sizes ranging from 32 inches to 75 inches and up to 150 pounds in weight.

For stud walls, provide continuous 3/4" plywood blocking in stud cavity

behind mounting locations. Coordinate final mounting height and location with Contracting Officer's Representative.

2.13 COMPARTMENTS AND CUBICLES

2.13.1 Toilet Compartments

Toilet partitions shall be floor-mounted, overhead-braced type. Material shall be solid solid polyethelene. Furnish basic configuration shown on RFP documents. Provide doors/stiles with a nominal width of 1 inch. Provide panels with a nominal width of 1 inch. Panels shall be scratch and water resistant; graffiti resistant; non-absorbent. Prepare panels as required to receive toilet paper holders, grab bars, and other toilet accessories as appropriate.

2.13.2 Urinal Screens

Urinal screens shall be floor mounted type. Secure wall hung urinal screens with continuous flanges that are full height of the screens. Fabricate screens from the same types of panels and pilasters as the toilet partitions. Use corrosion-resistant steel fittings and fasteners.

2.13.3 Solid Surface Shower Enclosures

Provide shower bases, surrounds, and/or enclosures in locations indicated on the plans. Shower bases and enclosures shall be fabricated from solid-polymer material specifically formulated for such installations. Provide at least one ABA accessible shower unit per sex as required by 36 CFR 1191 unless approved otherwise by the Government. Non-ABA shower size shall be minimum 36" by 36".

Shower wall enclosures shall provide a complete system of solid polymer components to include: shower base, wall panels, corner trim, soap dish, shampoo shelf, accessible transition/ramp, and panel edge trim. Dimensions of all components shall be standard manufacturer's dimensions to be field cut to fit. Panels shall be full width and height with seams occurring only at the inside corners of the enclosure. Soap dish and shampoo shelf shall be of a configuration, shape, and location as standard with the manufacturer's system.

2.14 TOILET ACCESSORIES

Provide all toilet accessories typical in restrooms, in quantities proportional to the size and fixture count in the restroom. Provide ABA compliant fixtures in locations and quantities as required by ABA. Provide commercial-grade items in all spaces, Provide stainless steel or satin nickel finish. Required items are as follows:

- a. Mirror(s) over lavatoies, either individlulaly or as one mirror spanning multiple lavatories
- b. Toilet Paper Dispensers
- c. Paper Towel Dispensers, automatic operating
- d. Sanitary Napkin Disposers
- e. Soap Dispensers, automatic operating
- f. Electric Hand Dryers
- g. Towel and Robe Hooks (NLT 2 per shower)
- h. Coat Hooks (NLT 1 per toilet stall)
- i. Grab Bars as required for accessibility
- j. Shower Curtain Rod and Shower Curtain (1 per shower) plus one for

the entry to shower area

k. Folding seats (1 per shower) as indicated on the drawings

l. Folding wall mounted baby changing tables in the Men's and Women's restrooms in the unclassified areas (2 changing tables total)

m. Recessed soap holders (1 per shower, same material and finish as wall material)

2.15 SAFETY SPECIALTIES

2.15.1 Defibrillator Cabinets

Provide three Defibrillator Cabinets for automated external defibrillators (AED). Locations to be determined during design. Cabinets shall be compatible with all major defibrillator models. Cabinet doors shall clear acrylic windows for observing defibrillators. Provide cabinet with audible alarm powered by 9 volt battery. Alarm shall be configured to sound when door is opened, and sound for 3 minutes. Alarm shall have an audible low battery indicator. Provide cabinets with graphics identifying the cabinets as defibrillator cabinets. Provide cabinets with text warning that alarm will sound if cabinets are opened. Provide text stating that defibrillator shall be used by trained responders only. Provide v-shaped projection-style wall signs. Locate signs on wall above defibrillator cabinets to mark their locations. AEDs are part of the FF&E bid option. Provide one AED per cabinet. AEDs that are located in the secured work area cannot use WiFi. AED shall be provided audio and visual prompts for CPR compression strength.

2.16 STORAGE SPECIALTIES

2.16.1 Cell Phone Lockers

Provide not less than 75 individually lockable aluminum or steel storage units for storage of cell phones. Cabinets shall be surface mounted on a wall that is not a part of the controlled boundary. Each phone storage unit shall be individually numbered and shall have a 5" tall by 6" wide by 8" nominal depth (or equivalent volume).

2.16.2 Personal Belongings Storage Lockers

Personal storage lockers for the Transition/Landing Zone shall be a minimum of 12" wide by 72" high by 12" deep, consisting of a double locker. Provide a base for the lockers to sit on. Lockers shall have hooks on the interior. Each locker shall be keyed and have number plate on them. Provide two keys for each storage locker, and two master keys for facility manager access. Coordinate keying and numbering requirements with contracting officer.

2.16.3 Restroom Lockers

Lockers shall be a minimum of 15" wide by 72" high by 12" deep, consisting of a double locker. Provide a base for the lockers to sit on. Lockers shall have at least two hooks on the interior. Doors shall be equipped for user-provided padlocks. Each locker shall have a number plate.

PART 3 EXECUTION

NOT USED

-- End of Section --

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SECTION 01 83 00

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SECTION 01 83 00

STRUCTURAL REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The design publications listed below are sources of criteria for structural design. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes, standards, and specifications.

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01	(2019; with Change 1, 2020) DoD Building Code
UFC 3-301-01	(2019, with Change 1, 2022) Structural Engineering
UFC 3-310-04	Seismic Design for Buildings (1 June 2013, including Change 1)
UFC 3-320-06A	Concrete Floor Slabs Subjected to Heavy Loads (1 March 2005)
UFC 4-010-01	(2018; with Change 1, 2020) DoD Minimum Antiterrorism Standards for Buildings

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 318/318R	(2014) Building Code Requirements for Structural Concrete and Commentary
ACI 530/530.1	(2013) Building Code Requirements and Specification for Masonry Structures and Related Commentaries

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2017) Steel Construction Manual
AISC 341	(2016) Seismic Provisions for Structural Steel Buildings
AISC 360	(2016) Specification for Structural Steel Buildings

AISC Steel Design Guide 3	Serviceability Design Considerations for Steel Buildings (2nd Edition, 2004)
AISC Steel Design Guide 5	Low-and Medium-Rise Steel Buildings (2003)

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100	(2012) North American Specification for the Design of Cold-Formed Steel Structural Members
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AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures
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ASTM INTERNATIONAL (ASTM)

ASTM A36	Specification for Carbon Structural Steel (2019)
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ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless (2018)
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ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes (2020)
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ASTM A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement(2020)
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ASTM A653	Specification for Steel Sheet, Zinc-coated Galvanized or Zinc-iron Alloy-Coated Galvannealed by the Hot-dip Process (2015; E 2020)
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ASTM A706	Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement (2016)
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ASTM A992	Standard Specification for Structural Steel Shapes (2011; R 2015)
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ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete (2018)
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ASTM C62	(2017) Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
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ASTM C90	(2021) Standard Specification for Loadbearing Concrete Masonry Units
ASTM C270	(2019a; E 2019) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F3125	Standard Specification for High Strength Structural Bolts, and Assemblies, Steel and Alloy Steel, Heat-Treated, Inch Dimensions 120/105 ksi Minimum Tensile Strength (2019)

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code
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STEEL DECK INSTITUTE (SDI)

SDI DDM04	(2015; Errata 1-3 2016; Add 1 2015; Add 2 20162006) Diaphragm Design Manual; 4th Edition
SDI DM	Design Manual for Composite Decks, Form Decks, and Roof Decks (MOC3 2016)

STEEL JOIST INSTITUTE (SJI) PUBLICATION

Steel Joist Institute	Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joists Girders (2010)
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1.2 PROJECT DESCRIPTION AND REQUIREMENTS

1.2.1 General Requirements

The facility is an existing structure originally constructed in 1997 and located at Grand Forks AFB. The north and south parts of the building are one story, while the middle part is two story. The structural system consists of steel frames, steel joists, and concrete floors. This project would include a full building renovation to be used as a Formal Training Unit (FTU) with a new supporting antenna farm located outside of the building. Please see Section 01 82 00, ARCHITECTURAL REQUIREMENTS for additional information for the FTU. Please see Section 01 82 00, ARCHITECTURAL REQUIREMENTS and Section 01 86 29, COMMUNICATIONS REQUIREMENTS for additional information for the antenna farm.

1.2.2 Design Code Criteria

The existing facility structural systems shall be inspected and evaluated before the design. The renovation and addition shall be accordance with the 2018 International Building Code (ICC IBC), International Existing Building Code (IEBC), standards established by the United States Department of Defense (DoD), and other national standards. The facility renovation shall be structurally designed and configured by the Contractor in accordance with the criteria shown on the RFP documents and contained herein. The facility renovation need to comply with DoD Force Protection requirements per the Unified Facilities Criteria

1.3 STRUCTURAL DESIGN LOADS AND CONDITIONS

Structural loading criteria shall be developed for the building using site and project specific criteria and the criteria and procedures indicated below. The building shall be classified as an "Occupancy Category II" facility in accordance with ICC IBC (Table 1604.5 for the determination of snow, seismic, and wind loads. The structural design should account for the effect of upgrading HVAC, electrical, plumbing, fire protection and communication systems on the capacity of the existing structure and its members. Structural renovation design of the building shall be compatible with the architectural design drawings.

It is the contractor responsibility for ensure the structure integrity for the building and its structural components during all construction stages. The structural design calculations and drawings shall be sealed by a professional engineer licensed by one of the 50 states

1.3.1 Dead Loads

Minimum design dead loads for common building materials shall be obtained from ASCE 7 or estimated from the existing building as applicable.

1.3.2 Roof Live Loads and Snow Loads

1.3.2.1 Minimum Roof Live Load

A minimum roof live load of 20 psf shall be provided for in the design to account for construction and maintenance loads. The minimum roof live load can be reduced. The minimum roof live load shall be applied in accordance with ASCE 7 and shall be used as a loading condition for the roof and independent of the calculated snow loads. Where uniform roof live loads are reduced to less than 20 psf in accordance with ASCE 7-16 Section 4.8.2 and are applied to the design of structural members arranged so as to create continuity, the reduced roof live load shall be applied to adjacent spans or to alternate spans, whichever produces the greatest unfavorable load effect.

1.3.2.2 Roof Snow Load

Roof snow load shall be applied in accordance with ASCE 7. Factors used in determining snow loads are as follows:

Terrain Category	=	C (ASCE 7 Section 26.7, Exposure C)
Snow Exposure Factor, C_e		(ASCE 7 Table 7.3-1, Partially Exposed)
Snow Thermal Factor, C_t		(ASCE 7 Table 7.3-2, All Structures)

		Unless Noted Otherwise)
Snow Importance Factor, Is		(ASCE 7 Table 1.5-2, Occupancy Category II)
Ground Snow Load, Pg	=	60 psf (Base standard)
Flat Roof Snow Load, Pf	=	0.7CeCtIsPg (ASCE 7 Section 7.3)

1.3.2.3 Rain-On-Snow Load

A rain-on-snow load, if applicable, shall be applied in accordance with ASCE 7.

1.3.3 Floor Live Loads

Floor live loads shall be in accordance with ASCE 7 for the type of occupancy indicated, except as modified herein, and to accommodate any special requirements from the buildings user after the renovation.

1.3.4 Wind Loads

Wind loads for both the main wind force resisting system and for components and cladding shall be determined in accordance with ICC IBC and ASCE 7 using the following parameters:

Basic Wind Speed, V	=	110 mph
Wind Exposure Category	=	C (ASCE 7, Section 26.7)
Directionality Factor, Kd	=	0.85 (ASCE 7, Table 26.6-1)

1.3.5 Seismic Loads

Seismic loads shall be determined in accordance with the applicable requirements of UFC 3-310-04, ICC IBC, and ASCE 7. The total lateral seismic force shall be determined using the following parameters:

Occupancy Category = II
 Seismic Importance Factor, Ie = 1.0 (ASCE 7 Table 1.5-2)
 Mapped Spectral Response Acceleration, Ss = 0.045
 Mapped Spectral Response Coefficient, S1= 0.017
 Design Spectral Response Acceleration, Sds = 0.048
 Design Spectral Response Coefficient, Sd1 = 0.027
 Site Classification = Class D *
 Seismic Design Category = A *

* Preliminary Site Classification assumed per ASCE 7 Section 11.4.2. Final Seismic Design Category shall be based on the Site Classification determined and noted in the Final Geotechnical Report to be provided by the Contractor.

1.3.6 Interior Partition Lateral Loads

Interior partitions shall be designed for a wind pressure of 5 psf normal to the partition. The deflection of interior partitions due to wind load shall not exceed $1/360$ the span for walls with brittle finishes and $1/240$ for walls with flexible finishes. Other design requirements such as seismic may be more restrictive and control the design of the partitions.

1.3.7 Load Combinations

Load combinations shall be in accordance with the ICC IBC.

1.3.8 Wind Uplift Resistance

Wind uplift calculations for roofing systems shall be based on the criteria for Wind Loads contained herein.

1.3.9 Deflections

Deflections of structural members and systems shall not be greater than allowed by applicable codes, references, and material standards (IBC, ACI, AISC, etc.) and shall not impair the serviceability of the structure. Deflection limits needed to restrict damage to ceilings, partitions, and other fragile non-structural elements shall not exceed the deflection over span length (1) limits permitted by the ICC IBC.

1.3.10 Drift

Lateral deflection or drift of structures and deformations of horizontal diaphragms and bracing systems due to code-specified wind effects shall not impair the serviceability of the structure. Drift limits applicable to wind loads shall be in accordance with ICC IBC, recommendations contained in AISC Steel Design Guide 3 "Serviceability Design Considerations for Steel Buildings" and AISC Steel Design Guide 5 "Low-and Medium-Rise Steel Buildings". The building structure shall be designed such that the code-specified wind loads (criteria noted above) do not cause a drift ratio of 0.002 ($H/500$) or a maximum inter-story drift of $3/8$ inch to be exceeded.

Drift limits applicable to code-specified seismic loads (criteria noted above) shall be in accordance with the ICC IBC.

1.3.11 Vibrations

All vibration producing mechanical (including roof top units), electrical, or other equipment shall be mounted in manner as to prevent the transfer of vibrations to adjacent parts or areas of the building. If necessary, large vibration producing equipment installed within the facility on the ground level shall be supported on individual isolated foundations. The isolated foundations shall be separated from the building slab-on-grade by a continuous $3/4$ inch expansion joint. The depth of floor framing members shall be selected with consideration to minimizing the effect of occupant-induced floor vibrations.

1.3.12 Foundation and Slab-On-Grade Design Criteria

1.3.12.1 Foundation Design

Foundation design criteria and the foundation type proposed to be built by the Contractor shall be based on recommendations contained in the Final Geotechnical Investigation Report which shall be provided by the Contractor. All parts of the foundation system shall be designed to keep dead load and maximum load footing pressures relatively uniform, in order to minimize differential settlements.

1.3.12.2 Subgrade Preparation

Final foundation and slab criteria, design, foundation type, and subgrade proposed to be built by the Contractor shall be based on recommendations contained in the Final Geotechnical Investigation Report which shall be provided by the Contractor.

1.3.12.3 Slabs-on-Grade Design

Slabs-on-grade (interior) shall be designed in accordance with the recommendations contained in the project specific Final Geotechnical Investigation Report and the guidelines of ACI 302.1R, "Guide to Concrete Floor and Slab Construction". Specifically, the design shall also be in accordance with UFC 3-320-06A "Concrete Floor Slabs Subjected to Heavy Loads", using the design vehicular loads.

Proper construction methods, workmanship, slab-on-grade materials and preparation, and concrete mix proportioning specifications shall follow the guidelines of ACI 302.1R, "Guide to Concrete Floor and Slab Construction".

The floor finish systems for the facility additions generally require that the moisture/vapor transmission rate through the slab be limited to a maximum of 3 pounds per 1000 square feet in a 24 hour period. This limit for moisture/vapor transmission rate can be achieved with a vapor retarder system in lieu of a vapor barrier system. As a minimum, a 20 mil thick, Class A, vapor retarder system meeting the requirements of ASTM E1745, shall be required beneath all building slabs-on-grade.

The slab-on-grade supporting subgrade system shall be in accordance with the recommendations of ACI 302.1R and recommendations contained in the Final Geotechnical Investigation Report. All interior slabs-on-grade shall be constructed over a vapor retarder system over a compacted 6 -inch capillary water barrier on compacted subgrade. The location of the vapor retarder system relative to the capillary water barrier shall be in accordance with recommendations contained in ACI 302.1R.

Slabs-on-grade shall be jointed and reinforced with temperature and shrinkage reinforcement located near the top of the slab in order to control shrinkage and limit curling. Slab-on-grade temperature and shrinkage reinforcement shall not be less than 0.18 percent per ACI 318/318R requirements. Maximum spacing of the slab-on-grade reinforcing bars shall not exceed three times the slab thickness.

1.3.12.4 Slabs-On-grade General Requirements

Slabs-on-grade shall be designed as "floating slabs" without rigid edge support and lateral and vertical movement unrestrained. An isolation joint

consisting of 30 lb. felt or 1/2-inch expansion joint material, is required where slabs abut vertical surfaces.

Crack control measures shall be incorporated in the slab design. Control joint spacing and details shall be as delineated in ACI 302.1R, as applicable.

1.3.12.5 Slabs-on-Grade with Ceramic or Quarry Tile Finish

Slabs-on-grade to receive a covering of ceramic or quarry tile shall have a minimum thickness of 5-inches, and shall be reinforced with No. 4 bars at 12-inches on center each way. The slab surface shall be as required to facilitate the installation of the tile. At interior edge locations the slab shall be doweled into the adjacent slab with 3/4 inch diameter x 16 inch long dowels at 12 inches on center.

1.3.12.6 Structural Stoops at Exterior Doorways

Structural stoops shall be provided at exterior doorways. Stoops shall have foundations extending down to frost depth and shall be rigidly attached to the building foundation walls. Stoops shall have 12 inches of uncompacted fill under the stoop slab. Stoop slabs shall drop 1/2 inch relative to the interior floor slab-on-grade at the threshold and slope away from the building at a 1/4 inch per foot slope minimum.

1.3.12.7 Concrete Floor Slab Finishes

All interior concrete slabs will receive a trowel finish unless noted otherwise. Interior slabs to receive mortar setting beds will receive rough slab finish. Slabs-on-grade shall be painted to prevent dusting at locations where the space between access flooring and the slab-on-grade beneath it serve as an air plenum.

1.3.12.8 Interior Equipment Pads

Floor mounted mechanical and electrical equipment shall be installed on 6-inch thick raised concrete housekeeping pads. The pads shall be reinforced with at least the minimum temperature reinforcement required by ACI 318. The pads shall be sized 6 inches larger on all sides than the dimensions of the base of the piece of equipment furnished, and all edges of the pad shall be chamfered.

1.3.12.9 Exterior Equipment Pads

Exterior mechanical or electrical equipment shall be installed on concrete pads. Equipment pads shall be a minimum of 8 inches thick and reinforced with at least the minimum temperature and shrinkage reinforcement required by ACI 318/318R. The pads shall be sized a minimum of 12 inches larger all around than the piece of equipment furnished and all edges of the pad shall be chamfered. The Contractor shall coordinate the design of the exterior equipment pads with the mechanical and electrical system design and the equipment selected to be installed by the Contractor.

1.4 STRUCTURAL MATERIALS DESIGN DATA

Materials for structural elements shall be as indicated herein and/or on the RFP drawings.

1.4.1 Reinforced Concrete

1.4.1.1 Design

Reinforced concrete shall be designed and detailed in accordance with the ICC IBC as modified by ACI 318/318R, and related current ACI publications that are applicable to the design. All concrete elements shall be reinforced with temperature and shrinkage reinforcement as recommended by ACI as a minimum.

1.4.1.2 Concrete Strength

The required 28-day concrete compressive strength (f'_c) shall be left to the Contractor's discretion, except the following shall be the minimum used for the locations shown:

Location	f'_c (Min.)	Unit Weight
Foundations	4500psi	145pcf
Slabs-on-Grade	4500psi	145pcf

The water cement ratio for any strength of concrete strength shall not be more than 0.48.

1.4.1.3 Reinforcing Steel

Reinforcing bars (deformed) used in concrete design shall be ASTM A615, Grade 60 ($F_y = 60\text{ksi}$). Reinforcing bars (deformed) required to be welded shall be ASTM A706, Grade 60 ($F_y = 60\text{ksi}$). The minimum bar size is No. 4 except for stirrups and ties which may be No. 3 per ACI. Nosing bars shall not be used in exterior concrete stairs.

Welded Wire Fabric, where used, shall be provided in flat sheets and conform to ASTM A1064 with a minimum yield strength, $F_y = 60\text{ksi}$. Precast concrete blocks shall not be used to support Welded wire fabric. Bar supports of steel or plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic shall support the fabricated bar mats, reinforcing steel and welded wire fabric adequately to remain in the designated location as prescribed in the design drawings; even during concrete placement.

1.4.1.4 Concrete Joints

Control joints and contraction joints shall be located to limit concrete cracking to a minimum. All exposed concrete joints shall be sealed with appropriate joint sealant.

1.4.2 Concrete Masonry

1.4.2.1 Design

Brick and concrete masonry design shall be in accordance with ACI 530/530.1 as modified by the ICC IBC. Reinforcement shall be sufficient to satisfy the calculated and prescriptive requirements for strength, shrinkage crack control, and seismic design.

Lateral support and connections between walls and the structural steel frames shall be designed to allow frame movement with minimum influence on

adjoining walls.

Concrete masonry crack control measures comprised of masonry control joint, joint reinforcement, and bond beams shall be incorporated in the design of concrete masonry walls and partitions. Masonry control joints (MCJ) shall be judiciously located at spacing no greater than the maximums recommended by the National Concrete Masonry Association. Masonry control joints shall not be placed closer than 24 inches from openings.

1.4.2.2 Concrete Masonry Material Strengths

Masonry materials shall meet the following minimum requirements:

Masonry shall have a specified prism strength $f'_m = 2000\text{psi}$ at 28 days.

Hollow concrete masonry units (CMU) shall be two cell normal weight aggregate units conforming to ASTM C90, Type I and have a minimum compressive strength of 1900psi on the net area (1000 psi on the gross area) at 28 days.

Brick masonry shall conform to ASTM C62.

Mortar shall be Type S, or matching existing type for masonry work built into existing masonry walls. Mortar shall conform to ASTM C270, with a specified minimum compressive strength of 1800psi at 28 days.

Grout shall conform to ASTM C476 and shall have a specified minimum compressive strength (f'_c) of 2000psi at 28 days.

1.4.2.3 Concrete Masonry Reinforcing

Reinforcing bars (deformed) used in masonry design shall be ASTM A615, Grade 60 ($F_y = 60\text{ksi}$). Reinforcing bars (deformed) required to be welded shall be ASTM A706, Grade 60 ($F_y = 60\text{ksi}$). The minimum reinforcing bar size is a No. 4.

1.4.3 Structural Steel

1.4.3.1 Design

Structural steel shall be designed in accordance with the ICC IBC and the AISC Specifications. All structural steel members shall be designed by the structural engineer to support all applicable loads. Structural drawings shall clearly show all structural members and their locations. Types of connections shall be consistent with the design assumptions for the basic type of steel construction used. Connections shall be designed and detailed to provide adequate capacities for the applied forces and moments. Connection design shall be the responsibility of the structural engineer and shall not be delegated to the steel fabricator.

1.4.3.2 Structural Steel Materials

Structural steel materials shall meet the following minimum requirements:

Steel Type	ASTM	Grade	Min. Yield Strength, F_y
Structural Wide Flange Beams & Columns (W-Shapes)	ASTM A992		50ksi 50ksi

Structural Tees (WT-Shapes)	ASTM A992		50ksi
Structural Channels & Angles (C, MC, & L-Shapes)	ASTM A36		36ksi
Structural Plates & Bars	ASTM A36		36ksi
Structural Steel Pipe	ASTM A53	B, Type E or S	35ksi
Structural Steel Tubing (TS-Shapes)	ASTM A500	B	46ksi
Rectangular or Square	ASTM A500	C	50ksi
Hollow Structural Sections (HSS Shapes)			
Structural Anchor Rods	ASTM F1554		36ksi
High Strength Structural Bolts	ASTM F3125		Fu=120ksi
			Fu=150ksi
Welding Rods (Structural Steel)	E70XX		Fu=70ksi
Welding Rods (Steel Decking)	E60XX		Fu=60ksi

1.4.3.3 Connections

Types of connections shall be consistent with the design assumptions for the basic type of steel construction used. Connections shall be designed and detailed to provide adequate capacities for the applied forces and moments. Connection design shall be the responsibility of a licensed structural engineer and shall not be delegated to the steel fabricator.

1.4.4 Steel Joists

1.4.4.1 Design

The design and selection of steel joists shall be governed by the Steel Joist Institute (SJI) Standard Specifications for Steel Joists and Joist Girders. The wind uplift requirements shall be clearly delineated on the design drawings or with the specifications. Joists requiring special design to resist wind uplift and non-uniform loads shall be designated as such on the drawings, and the required design loads provided. The designer shall provide joist-loading diagrams on the drawings for all joists with geometric configurations outside the scope of the SJI Standard Specifications for Steel Joists and Joist Girders. Joist end supports and anchorage to resist uplift shall be designed to accommodate the applied forces, including those resulting from wind and seismic loading.

1.4.5 Steel Decking

1.4.5.1 Design

The design and selection of steel deck shall be in accordance with the provisions of the Steel Deck Institute (SDI) Design Manual (SDI DM) for Composite Decks, Form Decks and Roof Decks. The designation of the steel decking type and gauge shall conform to SDI standards. Steel deck manufacturer's designations shall not be used. The minimum required section properties of the steel deck shall be required to be specified or noted on the design drawings and shall be determined as prescribed by the appropriate specifications of the Steel Deck Institute (DM) Design Manual for Composite Decks, Form Decks and Roof Decks.

Steel deck designed to function as a shear diaphragm shall be designed in accordance with the provisions of the Steel Deck Institute (DDM4) (SDI) "Diaphragm Design Manual" (4th Edition) (SDI DDM04).

1.4.5.2 Steel Decking Material

Steel decking materials shall meet the following minimum requirements:

Type	Minimum Yield Strength, Fy
Steel Roof Deck (Wide Rib)	33ksi
Composite Steel Floor Deck	33ksi

1.4.6 Cold-Formed Metal Framing (CFMF)

1.4.6.1 Design

Design and detailing of wall systems using cold-formed metal framing (CFMF) members to anchor masonry veneers shall be in accordance with the provisions of ICC IBC. Wall systems shall be specified using UFGS 05 40 00 Cold-Formed Metal Framing. Wind load deflection of wall systems to which masonry veneer is anchored shall be no more than 1/600 of the span of the wall. Design assumptions and details shall be coordinated with the specifications. Cold-Formed Metal Framing shall be designed in accordance with AISI S100.

1.4.6.2 Cold-Formed Metal Framing Material

Cold-formed metal framing shall be formed from corrosion-resistant steel, corresponding to the requirements of ASTM A653. Structural members shall have a minimum yield strength, Fy = 33ksi.

1.5 Special Inspections

Requirements for Special Inspections, as defined in the ICC IBC for various materials and building components, and as modified by UFC 3-301-01, shall be identified in Specification Section UFGS 01 45 35 "Special Inspections", as edited by the Designer of Record (DOR), to be included in the design documents, and are to be accompanied by a "Statement of Special Inspections" and a "Schedule of Special Inspections", as defined and required by UFGS 01 45 35 and ICC IBC, and also as edited by the DOR in accordance with the specific design conditions of the project. Specific inspection requirements included in the specification and schedule are to be consistent with the inspections required by the various design criteria codes, specifications and standards which govern the design, as defined and referenced hereinbefore. Special inspection inspectors shall be qualified as required by the most stringent of the qualifications defined in ICC IBC, UFGS 01 45 35, or the applicable codes and standards governing the design and construction, as referenced herein. The UFGS 01 45 35 specification inspector qualifications shall be edited accordingly. It should be noted that Special Inspections are to be conducted by an independent third party not in an ongoing business relationship with the contractor. Special inspection reports shall be developed, updated and submitted in accordance with the requirements of ICC IBC and UFGS 01 45 35.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

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INTERIOR DESIGN REQUIREMENTS
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PART 1 INTERIOR DESIGN REQUIREMENTS

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. Comply with the latest edition of the UFGS guide specification.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- | | |
|-----------|---|
| AATCC 134 | (2016) Electrostatic Propensity of Carpets |
| AATCC 174 | (2016) Antimicrobial Activity Assessment of New Carpets |

ASTM INTERNATIONAL (ASTM)

- | | |
|-----------------|---|
| ASTM C109/C109M | (2021) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) |
| ASTM C423 | (2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method |
| ASTM D395 | (2016; E 2017) Standard Test Methods for Rubber Property - Compression Set |
| ASTM D412 | (2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension |
| ASTM D1054 | (2002; R 2007) Rubber Property - Resilience Using a Rebound Pendulum |
| ASTM D1335 | (2017; E 2018) Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings |
| ASTM D256 | (2010) Determining the Izod Pendulum Impact Resistance of Plastics |
| ASTM D2047 | (2017) Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine |
| ASTM D2859 | (2016) Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials |

ASTM D7330	(2015) Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings Using Standard Reference Scales
ASTM F150	(2006; R 2013) Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
ASTM E1155	(2020) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F510	(2014) Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F793	(2010a) Wallcovering by Durability Characteristics
ASTM F1066	(2004; R 2014; E 2014) Standard Specification for Vinyl Composition Floor Tile
ASTM F1303	(2004; R 2021) Standard Specification for Sheet Vinyl Floor Covering with Backing
ASTM F1344	(2021a) Standard Specification for Rubber Floor Tile
ASTM F1700	(2020) Standard Specification for Solid Vinyl Floor Tile
ASTM F1859	(2021a) Standard Specification for Rubber Sheet Floor Covering Without Backing
ASTM F1861	(2021) Standard Specification for Resilient Wall Base
ASTM F1913	(2004; R 2014) Vinyl Sheet Floor Covering Without Backing
ASTM F2034	(2008; R 2013) Sheet Linoleum Floor Covering
ASTM F2169	(2015; R 2020; E 2020) Standard Specification for Resilient Stair Treads
ASTM F2195	(2013) Linoleum Floor Tile

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A137.1 (2019) American National Standards
Specifications for Ceramic Tile

CSA GROUP (CSA)

CSA B45.5-11/IAPMO Z124 (2011; Update 1 2012) Plastic Plumbing
Fixtures - First Edition

CARPET AND RUG INSTITUTE (CRI)

CRI 104 (2015) Carpet Installation Standard for
Commercial Carpet

CRI 105 (2015) Carpet Installation Standard for
Residential Carpet

CRI Test Method 103 (2015) Standard Test Method for the
Evaluation of Texture Appearance Retention
of Carpet Standards Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2021; TIA 21-1) Life Safety Code

NFPA 265 (2019) Standard Methods of Fire Tests for
Evaluating Room Fire Growth Contribution
of Textile or Expanded Vinyl Wall
Coverings on Full Height Panels and Walls

NFPA 286 (2019) Standard Methods of Fire Tests for
Evaluating Contribution of Wall and
Ceiling Interior Finish to Room Fire Growth

NFPA 701 (2019) Standard Methods of Fire Tests for
Flame Propagation of Textiles and Films

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-02 (2020; with Change 1, 2020; Change 2,
2022) High Performance and Sustainable
Building Requirements

UFC 3-120-01 (2014; with Change 3, 2017) Design: Sign
Standards

UFC 3-120-10 (2018; with Change 2, 2021) Interior
Design

UFC 3-600-01 (2016; with Change 6, 2021) Fire
Protection Engineering for Facilities

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS CCC-W-408 (Rev D; Notices 1, 2, 3) Wallcovering,
Vinyl Coated

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

- | | |
|-------------|---|
| 16 CFR 1630 | Standard for the Surface Flammability of
Carpets and Rugs (FF 1-70) |
| 36 CFR 1191 | Americans with Disabilities Act (ADA)
Accessibility Guidelines for Buildings
and Facilities; Architectural Barriers Act
(ABA) Accessibility Guidelines |

UNDERWRITERS LABORATORIES (UL)

- | | |
|--------|--|
| UL 723 | (2018) UL Standard for Safety Test for
Surface Burning Characteristics of
Building Materials |
|--------|--|

1.2 DESIGN CRITERIA

Design this building in accordance with this document, NFPA 101, 36 CFR 1191, UFC 3-600-01, UFC 3-120-10, UFC 3-120-01, and Grand Forks Air Force Base Installation Facilities Standards. Comply with the flame spread and smoke development limits herein and the requirements of NFPA 101 for all interior finish materials.

1.3 BUILDING INTERIOR FINISHES

Reference Room Data Sheets for locations of interior finishes.

1.3.1 Floor Surface Preparation and Materials

Prepare substrate and provide surface preparation materials, including any recommended underlayments, in accordance with the flooring manufacturer recommendations for the subfloor conditions.

1.3.2 Carpet

Provide antistatic carpet with three distinctly different colors. Carpet must be broadloom and tile, 100% continuous filament, solution dyed and/or yarn dyed, branded nylon with loop construction. Provide synthetic primary and secondary backing materials that are customarily used and accepted by the trade for each type of carpet. Preference should be given to products containing recovered material when possible. Carpet must meet the following minimum requirements:

1.3.2.1 Minimum Pile Characteristics

Provide carpet with tufted construction, loop pile, minimum 1/8" gauge and minimum pile density of 4725. Provide carpet with a greater than or equal to 3.0 (Heavy) TARR traffic level classification in accordance with ASTM D7330 or CRI Test Method 103.

1.3.2.2 Static Control

Provide static control that is appropriate for the function of the room.

1.3.2.3 Flammability and Critical Radiant Flux Requirements

Carpet must comply with 16 CFR 1630 or ASTM D2859. Provide carpet in corridors and exits with a minimum average critical radiant flux of .45

watts per square centimeter when tested in accordance with ASTM E648.

1.3.2.4 Tuft Bind

Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 10 pound average force for loop pile broadloom, 3 pound average force for cut pile broadloom, and 8 pound average force for modular carpet tile.

1.3.2.5 Warranty

Provide manufacturer's standard performance guarantees or warranties including minimum ten year wear warranty, two year material and workmanship and ten year tuft bind and delamination.

1.3.2.6 Recycling of Existing Carpet

Recycle existing carpet to be removed so it doesn't go to a landfill. Add requirement to the carpet specification that carpet is to be removed with delivery to a manufacturer that accepts recycled carpet. Removal and handling of existing carpet must be per the manufacturer's recommendations. Include a submittal requirement (SD-07 Certificate) in the carpet specification for recycled carpet that shows compliance with these requirements. It is recommended that this requirement be included in UFGS 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.

1.3.2.7 Installation

Perform all work by manufacturer's approved installers in accordance with the manufacturer's printed instructions and CRI 104/CRI 105. For warranties to be valid install all carpet in accordance with the installers guidelines, including preparation of subfloor. Install broadloom carpet direct glue down or pre-applied adhesive glue down. Install carpet tile with release adhesive or a manufacturer approved adhesive tab system. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation as required by the carpet manufacturer.

1.3.3 Tread Inserts for Entrance Mat

Provide tread inserts consisting of carpet/bristle filament mix .

1.3.4 Static Control Flooring

1.3.4.1 Static Dissipative Resilient Flooring

1.3.4.1.1 Static Dissipative Vinyl Tile

Static-dissipative vinyl tile must be a homogeneous vinyl product and conform to ASTM F1700. Provide electrical resistance from surface to surface and surface to ground between 1,000,000 ohms (1.0×10 to the 6th) and 1,000,000,000 ohms (1.0×10 to the 9th) when tested in accordance with ASTM F150. Tile must be 24 inches square and 1/8 inch thick.

1.3.5 Luxury Vinyl Tile

Conform to ASTM F1700 Class III printed film (minimum wear layer thickness 0.030 inch (30 mil) and minimum overall thickness 0.098 inch. Provide tile with a factory protective finish that enhances cleanability and

durability. Provide minimum 15 year manufacturer's standard performance warranty.

1.3.6 Rubber Flooring

Conform to ASTM F1344 for tile, Class 1 homogeneous, Type A (solid color) or Type B (through mottled). Provide smooth or hammered surface.

1.3.7 Stair Treads, Risers, and Stringers

Conform to ASTM F2169 for rubber treads, risers, and stringers. Provide treads with hammered or raised surface. Provide either a one piece nosing/tread/riser or a two piece nosing/tread design with a matching coved riser. Provide stringer angles on both the wall and banister sides of the stairs and landing trim.

1.3.8 Wall Base

Conform to ASTM F1861 for rubber base. Provide coved (installed with resilient flooring) and straight (installed with carpet) base, 4 inches high and a minimum 1/8 thick with job formed corners.

1.3.9 Transition Strips

Provide transition strips where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When transition strips are required at doors install them under door centerlines. Transition strips are not required at doorways where thresholds are provided. Provide tapered mouldings of vinyl or rubber unless otherwise specified. Provide an aluminum transition strip between porcelain tile and other flooring types. Provide types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified.

1.3.10 Ceramic Tile/Porcelain

Conform to ANSI A137.1, moderate to heavy grade only. Provide glazed or unglazed porcelain tile, base, and trim with the color extending uniformly through the body of the tile. Except for accent tile provide large format tile larger than 12 x 12 inches. Provide floor tiles with a wet dynamic coefficient of friction (DCOF) value of 0.42 or greater when tested in accordance with ANSI A137.1 requirements.

1.3.11 Paints and Coatings

Provide paints and coatings appropriate for the exposure condition, required performance characteristics, and type of substrate to accept such finish. Surface preparation and material requirements must comply with LEED VOC limitations and with the minimum requirements identified in UFGS 09 90 00 PAINTS AND COATINGS. See the bridging documents for spaces to be painted.

The following surfaces are not to be painted:

- a. Metal surfaces of aluminum, stainless steel, chromium plate, bronze, copper, or similar finish materials.
- b. Surfaces of hardware, fittings, sprinkler heads, fire protection equipment, and other factory finished items not requiring a painted

finish.

- c. Factory finished surfaces must not be painted unless specifically listed to receive paint.

1.3.12 Interior Signage

Signage must conform to 36 CFR 1191 (ABA-ADA), NFPA 101, and UFC 3-120-01 Design: Sign Standards. Provide signage for all rooms, including toilets, unless otherwise directed by the Contracting Officer. Provide stairwell and tactile exit signs as required by NFPA 101. Also, provide no smoking signs at building entrances as required by UFC 1-200-02 and the User. Provide all signs with exception of those for toilets, mechanical, electrical and communications rooms, stairwell, no smoking, and exit signs with a clear sleeve that will accept a paper insert, unless otherwise noted by the Base Civil Engineer (BCE) Office. Provide paper and software for creating text and symbols for computers identified by owner for Owner production of replacement paper inserts required after project completion. Provide building directories and directional signage. Provide alarm system, restricted area, and other facility specific signs as required to meet design and project requirements. Coordinate all signage requirements, including message content, room numbering, and placement of signs with User and Contracting Officer.

1.3.13 Solid Surface Material

Provide solid surface material for countertops, backsplashes, lavatories, and window sills. Solid surface material to be homogeneous filled solid polymer, not coated, laminated or of a composite construction, meet CSA B45.5-11/IAPMO Z124 requirements and be composed of cast 100 percent acrylic. Color and pattern must go through the thickness of the material. Provide minimum of 1/2 inch thick material for countertops and window sills.

1.3.14 Shower Surrounds and Shower Pans

Provide solid surface material for shower surrounds and shower pans. Material to be homogeneous filled solid polymer, not coated, laminated or of a composite construction, meet CSA B45.5-11/IAPMO Z124 requirements, and be composed of cast 100 percent acrylic. Color and pattern must go through the thickness of the material.

1.3.15 Roller Window Shades

Provide roller window shades with light filtering shade cloth. Provide an L-shaped fascia. Roller tube must operate smoothly and be of sufficient diameter and thickness to prevent excessive deflection. Operation to be manual and operated chain drive. The shade cloth must meet the performance described in NFPA 701, small scale test. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without requiring removal of brackets and end or center supports.

1.3.16 Warranty

Provide warranties that comply with the UFGS specification minimum requirements, unless otherwise noted. When manufacturers standard performance guarantees or warranties exceed the minimum requirements identified, provide the standard performance guarantee or warranty.

1.3.17 Installation of Finishes

All finishes must be installed as per manufacturer's recommended installation instructions, to include recommended equipment, adhesives, and other related items. Furnish and install all finishes and related accessory components necessary for a complete, functional, and finished installations.

1.3.18 Extra Materials

Provide extra material for all finishes in minimum quantities of 2% to 5%. Required quantity for range of percentage must be coordinated with the Contracting Officer.

1.4 BUILDING FINISH COLORS

The word "color" as used herein includes surface color and pattern. Color selections must provide an aesthetically pleasing, comfortable, easily maintainable, and functional environment for the occupants. Coordination of interior and exterior building colors and finishes is necessary for a cohesive design. Color selection must be appropriate for the building type. Limit the number of similar colors for each material.

Grout: Provide medium range colors for ceramic and porcelain tile grouts to help hide soiling.

Plastic Laminate and Solid Surface Material: Provide materials that are patterned or are mottled, flecked or speckled; except for solid surface lavatories solid colors are not acceptable. Countertops at sinks must be light to medium range in color to help hide water spotting. Dark color solid surface materials are not recommended since they show scratches more readily.

Carpet: Solid color carpet may be used as a border or small area of accent in higher profile spaces to add interest. Recommend the use of several coordinating carpet patterns within the same color-way within the facility to provide variety and continuity between different areas.

Patterns:

- Use variation of color or floor patterns to visually shorten long corridors and add interest.
- Provide wall and/or floor tile patterns using several coordinating colors in the toilets as appropriate. Tile patterns must be appropriate to size and shape of rooms.

Accent Walls: Recommend the use of accent walls when appropriate to add interest.

Stained Woodwork: Match stained woodwork throughout the facility.

Miscellaneous Items: Finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms/warning lights, emergency lighting, and other miscellaneous items must be coordinated with the building interior design. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) with the ceiling color.

1.4.1 Color Schedule

Finish colors are listed to establish design direction for the facility. The manufacturers referenced are not intended to limit the selection of equal colors from other manufacturers. Colors for finishes not identified must be compatible and coordinate with the listed finish colors and must be coordinated with the Contracting Officer.

1.4.1.1 Interior Finish Colors

Coordinate interior finishes and colors with the User.

1.4.1.2 Exterior Finish Colors

See Section 01 82 00 ARCHITECTURAL REQUIREMENTS for exterior finish and color information.

1.5 FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

1.5.1 FF&E Design

Provide FF&E design and conform to the requirements of the UFC 3-120-10 Design: General Interior Design Requirements. Coordinate product and functional requirements with the User. Consider quality, function, aesthetics, comfort, safety, and sustainability during the selection of furnishings. Furniture items to be included in the FF&E package include workstations, seating, tables, storage, filing, artwork, appliances, automated external defibrillators (AEDs), and accessories. Coordinate furniture styles, finishes, and upholsteries with the building design. Design the furniture package in accordance with the Federal Acquisition Requirements, the User Requirements, and the Contracting Office's procurement methodology. Coordination is required with Contracting Office to insure that the FF&E design package is procurable. Specify furniture from the GSA Schedules.

Provide three automated external defibrillators (AEDs) as part of the FF&E Design. Locations to be determined during design. Provide AED's that are compatible with defibrillator cabinets that are specified as part of the base bid. AEDs that are located in the secured work area cannot use WiFi. AED shall be provided audio and visual prompts for CPR compression strength.

1.5.2 Furniture Requirements

Provide fire retardant materials to the maximum extent possible and comply with U.L. listings where applicable. Specify user friendly features such as radius edges. Sharp edges and exposed connections are not acceptable. Conceal clips, screws, and other construction elements where possible. When specifying furniture consider features that prevent damage from vacuum cleaners and maintenance products. Upholstery fabric must meet Wyzenbeek Abrasion Test; 35,000 minimum double rubs, 50,000 preferred. It is recommended that heavier use areas have a minimum 50,000 double rubs. A topical or inherent soil retardant treatment is required. Upholstery fabric must be patterned to help hide soiling. Specify silicone, vinyl, Crypton or hard surface material in heavy use areas as coordinated with the User and Corps Interior Designer. Coordinate specific furniture features and requirements with the User and Corps Interior Designer. Furniture systems must be powered and support communications, unless directed otherwise.

1.5.3 Furniture Plans

See drawings for furniture plan. Furniture layout must be functional and coordinate with the building design to assure that locations of electrical outlets, switches, J-boxes, communication outlets, and lighting within the building are appropriate. The layout must also be coordinated with other building features such as architectural elements, thermostats, location of TVs, etc. Locate furniture in front of windows only if the top of the item falls below the window. The furniture layout must conform to requirements specified in 36 CFR 1191, and NFPA 101.

1.5.4 Purchase and Installation

FF&E purchase and installation is a bid option to the construction contract.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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SECTION 01 86 10

MECHANICAL REQUIREMENTS

PART 1 MECHANICAL REQUIREMENTS

1.1 MECHANICAL SYSTEM CRITERIA

1.1.1 General Parameters/Reference

Mechanical systems shall be designed to comply with this section and the documents listed below. The publications are referred to in the text by basic designation only. The latest edition of the following standards and codes in effect and amended as of the date of the supplier's proposal, and any subsections thereof as applicable, shall govern design and selection of equipment and material supplied:

ASSOCIATED AIR BALANCE COUNCIL (AABC)

AABC MN-1 (2002; 6th ed) National Standards for
Total System Balance

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A13.1 (2015) Scheme for the Identification of
Piping Systems

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS (ASHRAE)

ASHRAE Handbooks (2013-2016)

ASHRAE 15 (2013) ANSI/ASHRAE Standard 15-Safety
Standard for Refrigeration Systems and
ANSI/ASHRAE Standard 34-Designation and
Safety Classification of Refrigerants

ASHRAE 189.1 (2011) Standard for the Design of
High-Performance Green Buildings Except
Low-Rise Residential Buildings

ASHRAE 55 (2013) Thermal Environmental Conditions
for Human Occupancy

ASHRAE 62.1 (2013) Ventilation for Acceptable Indoor
Air Quality

ASHRAE 90.1 (2010) Energy Standard for Buildings
Except Low-Rise Residential Buildings

ASME INTERNATIONAL (ASME)

ASME CSD-1 (2016) Control and Safety Devices for
Automatically Fired Boilers

ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM D1785	(2012) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code
ICC IMC	(2018) International Mechanical Code
ICC IPC	(2018) International Plumbing Code
ICC IEC	(2012) International Energy Code
ICC IGC	(2012) International Gas Code

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

NEBB-01	(2009) Procedural Standards for Whole Building Systems Commissioning of New Construction; 3rd Edition
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54	(2015) National Fuel Gas Code
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 72	(2013) National Fire Alarm and Signaling Code
NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 90B	(2015) Standard for the Installation of Warm Air Heating and Air Conditioning Systems
NFPA 91	(2020) Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists and Noncombustible Particulate Solids

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA Guidelines	(2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition
SMACNA 1966	(2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

ODDG (2019) Omaha District Design Guide

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01 (2013, with Change 3) General Building Requirements

UFC 1-200-02 (2013, with Change 3) High Performance and Sustainable Building Requirements

UFC 3-310-04 (2013) Seismic Design for Buildings

UFC 3-400-02 (2003) Engineering Weather Data

UFC 3-401-01 (2013) Mechanical Engineering

UFC 3-410-01 (2013) Heating, Ventilating, Air Conditioning and Dehumidifying Systems

UFC 3-410-02 (2012) LonWorks Direct Digital Control for HVAC and Other Local Building Systems, with change 1, 1 July 2013

UFC 3-420-01 (2004) Plumbing Systems, with change 10, 26 October 2015

UFC 3-430-01FA (2003) Heating and Cooling Distribution Systems

UFC 3-430-07 (2003) Inspection and Certification of Boilers and Unfired Pressure Vessels

UFC 4-010-01 (2012; with Change 1) DoD Minimum Antiterrorism Standards for Buildings

UFC 3-450-01 (2003) Noise and Vibration Control

UFC 3-600-01 (2016) Fire Protection Engineering for Facilities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

EO 13423 (2007) Strengthening Federal Environmental, Energy, and Transportation Management

PL 109-58 Energy Policy Act of 2005 (EPA05)

PL 110-140 Energy Independence and Security Act of 2007

1.2 GENERAL REQUIREMENTS

The purpose of this project is to renovate Building 631 at Grand Forks Air Force Base. The building is a two story building that is currently unused. The building will be renovated into a Formal Training Unit. The existing mechanical/hvac equipment and associated piping will be demolished and replaced with new equipment. The plumbing systems in the building are in good condition and will be remain. New or relocated fixtures will tie into the existing system. Descriptions of the mechanical systems are listed below for the different space functions, and in the Room Data Sheets provided.

Mechanical equipment for occupied areas will be provided with unoccupied/occupied modes through the building Direct Digital Control (DDC) System.

Building Envelope: The building envelope load will be based on the architectural plans and meet the minimum requirements of ASHRAE 90.1.

Ventilation Rates

Occupied Office Areas	5 cfm/person + 0.06 CFM/SQ FT
Rest Rooms/Showers	0.5 CFM/SQ FT (Exhaust)
Janitor	1 CFM/SQ FT (Exhaust)

Internal Heat From Electrical Equipment

Load calculations will take into account heat generated from anticipated equipment, lighting, and misc. loads. Loads for electrical equipment will be based on conservative heat release values. Server rooms will require in-row cooling units. Communication rooms (and electrical rooms where necessary) will be provided with split-system heat pumps to maintain the space temperature. Server rooms will be provided with in-row chilled water cooling units. The Room Data sheets include equipment heat loads and other room specific requirements and information.

HVAC SYSTEMS

DEMOLITION

The existing mechanical/HVAC systems will be demolished and replaced with new systems. All equipment demolished will have its associated controller and wiring demolished as well.

Plumbing demolition is very limited and will only require what is necessary to tie new fixtures into the existing system.

NEW SYSTEMS

New systems will be designed for all areas based on their function in accordance with the applicable UFC's. New air-cooled chillers and high-efficiency condensing boilers will be provided as the primary cooling and heating sources for the building. Where chillers are used, they may be limited to units manufactured by Trane in accordance with Air Force approved Justification and Approval. Consult with Grand Forks 319 CES to determine if this requirement is still in effect. All ancillary

equipment for the boilers and chillers (expansion tanks, pumps, glycol and chemical feeders, etc) will be provided along with new heating and chilled water piping distribution. A redundant back-up chiller will be provided and will be sized to accommodate the load required for rooms indicated as requiring redundant hvac in the room data sheets. Three chillers (each sized at 50% of the total building cooling load) may be provided to meet the redundancy requirements. Redundant chilled water and heating water pumps will be required. In-row cooling with chilled water coils will be provided for the server rooms. The majority of the renovated building will be a Secure Working Area and all mechanical work will be designed to meet the requirements of UFC 4-010-05 and the IC Tech Spec for ICD/ICS 705.

CONTROLS

New Direct Digital Controls will be provided for each new piece of equipment and will be integrated into a new building automation system. The system will be compatible with any base standards for communication protocol. Each air handler, terminal unit, split system unit, and cabinet or unit heater will be provided with dedicated temperature sensor providing flexible and independent space temperature controllability.

LIFE CYCLE COST ANALYSIS

Different mechanical system options were evaluated based on their initial cost and annual energy cost savings. An energy model was created to simulate the building energy use, and specifically the mechanical systems. Three viable system alternatives were considered. The first would use a similar system to the existing to be replaced. High efficiency condensing boilers would be the heating source with an air cooled chiller serving the areas to be cooled. Variable Air Volume air handlers with VAV boxes would serve the office areas. The second option would be similar to the first except water-cooled heat pumps would be used as the main heating and cooling source. The third option would use a geothermal heat pump system to heat and cool the office areas. This system would be supplemented by a smaller condensing boiler as a back-up heating source due to the imbalance in heating and cooling loads. The cost of the major system components were taken from Mechanical Costs with RSMeans data (2020) and the page numbers are indicated in the LCCA. The energy costs were based on Grand Forks electrical and natural gas rates. The BLCC program was used with system cost data and annual energy usage from the model created using Trane Trace 700. Output reports are included as an Appendix. In summary, the condensing boiler/air cooled chiller option was the most cost effective solution for this building. This general system type will be used unless another analysis or option is shown to be more advantageous.

UTILITY REQUIREMENT

Grand Forks AFB owns and maintains the natural gas lines on base. Any work required for underground gas lines or the building meter/regulator will be in accordance with the base standards.

Drawings, specifications, design analysis and calculations shall be provided as required for the 60 percent design and the Final design submittals, and shall be in accordance with Section 01 33 00.36 60 PERCENT DESIGN REQUIREMENTS, and Section 01 33 00.38 100 PERCENT DESIGN REQUIREMENTS.

The mechanical engineering design and construction of the following systems shall be included:

- a. Heating, Ventilation, Exhaust Systems, and Air Conditioning Systems
- b. Building Management System (DDC Controls for HVAC)
- c. Operation and Maintenance Requirements
- d. Testing

All systems description and performance requirements in this specification indicate the minimum requirements. Calculations shall be performed to determine equipment capacities and sizing.

- a. Provide mechanical systems, complete and ready for operation. The design and construction of all mechanical systems, including manufacturer's products, shall meet the instructions and requirements contained herein and the requirements of the referenced technical guide specifications. Where conflicts between these instructions and the guide specifications or above mentioned criteria exist, the most stringent shall take precedence. Any installation requirements within these instructions, but not contained in the specifications, shall be added to the specification or shown on the drawings.
- b. The design shall be economical, maintainable, energy efficient and shall take into account the functional requirements and planned life of the facility. Ease of access to components and systems in accordance with industry standards and safe working practices is a design requirement.
- c. Standard Products - Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product that have been in satisfactory use for at least 2 years prior to bid opening. The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted.
- d. Calculations shall be provided for all new mechanical equipment such as boilers, pumps, fans, ducts, unit heaters, or cooling units regardless of end use. Heating and cooling calculations for the building must be performed by computer analysis i.e., Elite Software Inc., Trane Trace Load 700, Carrier E20-II Hourly Analysis Program (HAP) etc. Documentation shall include complete input and output summaries.
- e. It shall be the responsibility of the Design Build Contractor to assume full responsibility of all final calculations, equipment designs, equipment layouts, and to provide fully operational systems.

1.2.1 Facility Description

See Section 01 81 00 for a description of the facility and overall scope of work.

1.2.2 Sustainable Design

The design of the facility shall incorporate and promote sustainable design principles for the built environment, as outlined in UFC 1-200-02 HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS.

1.2.3 Design Conditions

The following conditions shall be taken into consideration for the design. Location and weather related design information is provided by UFC 3-400-02, Design: Engineering Weather Data and shall be used in designing the mechanical systems.

1.2.3.1 Site Elevation

Equipment design elevation is 910 feet above sea level.

1.2.3.2 Latitude

47.96° North

1.2.3.3 Longitude

97.40° West

1.2.3.4 Outside Design Conditions

Summer Conditions	86°F dry bulb - 1%	
	70°F MCWB - 1%	
Mean Daily Range	26.1°F dry bulb	
Winter Conditions	-20°F dry bulb - 99.6%	
	-20°F MCWB - 99%	
Cooling Degree Days	2357	Note: CDD50
Heating Degree Days	9380	Note: HDD65

1.2.3.5 Inside Design Conditions

Space	Temperature Requirement	Humidity Requirement
Office Areas	78 F dry bulb - cooling 68 F dry bulb - heating	

Space	Temperature Requirement	Humidity Requirement

1.2.3.6 Minimum Ventilation Requirements

All normally occupied spaces shall be mechanically ventilated in accordance with ASHRAE 62.1-2013.

1.2.3.7 Cooling Load

Per load calculations. Coordinate with Electrical Designer.

1.2.3.8 Building Heating Load

Per load calculations.

1.2.3.9 Noise Levels

Noise levels shall remain within acceptable criteria as defined by UFC 3-450-01.

1.2.3.10 Structural

Attach interior ceiling mounted fixtures to the supporting structural system (i.e., use seismic detailing from UFC 1-200-01 and UFC 3-310-04) in structures. This includes mechanical equipment, ducting, and piping.

Equipment and piping requiring structural support shall be located in such a way to minimize support steel costs while providing adequate maintenance access.

1.2.4 Operation

The system shall be designed to operate automatically year round, twenty four (24) hours per day, seven (7) days per week. Equipment and systems shall be designed for remote operation.

1.2.5 Mechanical/Electrical Equipment Coordination

Arrangement of all mechanical equipment and piping shall be coordinated with electrical work to prevent interference with electrical conduits. Electrical conduits and mechanical piping shall not restrict access to the mechanical equipment for maintenance or repair. Clearances required by NFPA 70 above and in front and above of electrical panels and devices shall be maintained. Mechanical equipment (pipes, ducts, etc.) shall not be installed OVER OR WITHIN SPACE which is dedicated to transformers, panelboards, or other electrical equipment unless items solely serve the

area. When electrical equipment is located in a mechanical equipment space, the dedicated electrical space shall be indicated by a dashed line and noted "Electrical Equipment Space".

1.2.6 HVAC Control Instrumentation

Control instrumentation shall adhere to UFC 3-410-02.

1.2.7 Utility Interruptions

Certain limitations on utility interruptions apply. Unauthorized utility interruptions will not be permitted. Any work that requires a utility interruption shall be scheduled in advance. Outages are subject to postponement or cancellation by site authorities without prior notification. Coordination requirements of utility interruptions shall be in accordance with Document 00 73 00 SPECIAL CONTRACT REQUIREMENTS. All utility interruptions shall be identified with notes on the project drawings.

1.2.8 Spare Parts Lists

Proprietary spare parts lists that require more than a 60 day lead time, and/or any special service tools shall be provided to the Government prior to acceptance of the system

1.3 EQUIPMENT IDENTIFICATION AND ABBREVIATIONS

This section contains requirements for the identification and abbreviation of mechanical equipment.

1.3.1 Abbreviations

The following list of abbreviations shall be used to describe the mechanical equipment types:

Air-Cooled Condensing Unit	CU
Air Filter	AF
Air Handling Unit	AC
Air Separator	AS
Airflow Measuring Station	AFS
Building Automation System	BAS
Boiler	BLR
Cabinet Unit Heater	CUH
Exhaust Fan	EF
Expansion Tank	ET
Control Valve	CV
Diffuser	D

Domestic Hot Water	DHW
Gov't Furnished Design Build Contractor Installed	GFCI
Gov't Furnished Gov't Installed	GFGI
Grille	G
Heating Coil	HC
Heating Hot Water	HW
Intake Hood	IH
Local Control Panel	LCP
Louver	L
Motor Operated Damper	MOD
Heating Water Pump	HWP
Boiler Pump	BP
Register	R
Supply Fan	SF
Unit Heater	UH
Utility Monitoring and Control System	UMCS

The proposal shall indicate any abbreviations to be used for mechanical equipment not listed.

1.4 IDENTIFICATION OF PIPING

All piping in accessible spaces shall be identified with color coded bands and titles in accordance with ANSI A13.1 and coordinate with existing systems.

Identification of the contents of a piping system shall be by lettered legend, giving the name of the contents in full or abbreviated form. Arrows shall be used to indicate direction of flow. Where flow can be in both directions, arrows in both directions shall be displayed. Contents shall be identified by a legend with sufficient additional details such as temperature, pressure, etc., as are necessary to identify the hazard. Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches, and where pipes pass through walls or floors; and at intervals on straight pipe runs sufficient for identification. Identification may be accomplished by stenciling, the use of tape, or markers.

Color should be used to identify the characteristic hazards of the pipe contents. Color should be displayed on or contiguous to the piping by any physical means, but in combination with legend. Color may be used in continuous, total length coverage or in intermittent displays. Proposal response shall designate colors for the following, but not limited to, service fluids: fire quenching fluids, natural gas, fuel oil, propane, potable water, chilled water, heating hot water, and condenser water.

1.5 SEISMIC PROTECTION FOR MECHANICAL PIPING, DUCTWORK, AND EQUIPMENT

Structural bracing and mounting of mechanical piping, ductwork, and equipment shall be designed in accordance with UFC 1-200-01, UFC 3-310-04, and the ODDG.

1.5.1 Piping

Piping within the facility, except fire protection piping, is required to have seismic restraints complying with UFC 1-200-01 and UFC 3-310-04.

1.5.2 Ductwork

Ductwork within the facility is required to have seismic restraints complying with UFC 1-200-01 and UFC 3-310-04.

1.5.3 Miscellaneous Equipment

Miscellaneous items which consist of a number of individual components built into an assembly by the manufacturers may require additional internal reinforcements to meet the requirements of UFC 1-200-01 and UFC 3-310-04.

1.6 CHEMICAL TREATMENT OF WATER FOR MECHANICAL SYSTEMS

Chemical treatment of the heating and chilled water systems will be required. A chemical treatment plan shall be submitted by a chemical treatment specialist and shall be based on a water analysis and all applicable requirements listed in the applicable UFGS guide specification. Water system testing shall be for a period of one-year with the frequency recommended in the UFGS guide spec.

1.7 THERMAL INSULATION OF MECHANICAL SYSTEMS

Insulation of hydronic water piping systems and equipment, refrigeration lines and equipment, and the insulation of the duct systems shall meet the more stringent of ASHRAE 189.1, UFGS 23 07 00, and the ODDG. Refrigeration, and hydronic water piping shall be required to follow tabulated thicknesses.

1.7.1 Insulation Covers

Provide removable and reusable insulation covers at all check valves, control valves, strainers, filters, or any other piping component requiring access for routine maintenance. Exposed exterior insulation shall be covered by an embossed aluminum metal jacket. All piping with metal jacket shall be identified on the drawings.

1.8 HVAC DEMOLITION

Mechanical equipment to be demolished is described in previous sections. All equipment indicated to be demolished shall be removed from the site and disposed of in accordance with any state or federal laws.

1.9 HVAC SYSTEM DESIGN

The HVAC system shall be designed and built to satisfy the thermal and indoor air quality requirements of the building. This includes all associated air distribution equipment, thermal conditioning and ancillary equipment. Provide a complete system.

1.9.1 HVAC Systems

After the demolition and removal of the HVAC equipment, new air handler systems shall be provided. The systems serving the office areas shall be air handling units with heating and chilled water coils. VAV air handlers shall utilize single duct VAV terminal boxes with hot water reheat. The number of boxes will be determined by design but multiple zones with different orientations or occupancies shall not be served by a single box. Air handlers shall be provided with prefilters and final filters. Final filter shall be MERV-13 rated. Spaces served by all air handlers shall be positively pressurized to exclude infiltration of dust, fumes, and unconditioned air. New ductwork shall be provided after the removal of all existing ductwork. New aluminum or galvanized steel diffusers, registers, and grilles shall be provided in the new acoustical lay-in ceiling.

A new air-cooled chiller shall be provided to serve the air handlers. The chiller shall be sized based on design calculations and a backup chiller will be sized for the rooms required to have redundant cooling (see Room Data sheets). Three chillers (each sized at 50% of total building load) may be provided to meet the requirement. Chilled water piping shall be provided along with all required equipment, pumps, valves, and other equipment and instruments to provide a functional and properly operating system. Two chilled water pumps shall be provided each sized at 115% of the flow requirement. The need for a chilled water buffer tank shall be evaluated and implemented if recommended by the manufacturer. Freeze protection shall be provided by the use of a glycol-feed system. The system shall have a concentration of 35% propylene glycol.

Two new high-efficiency condensing boilers shall be provided to serve the AHU heating coils. The boilers shall each be sized at 65% of the design heating load calculations. The boilers shall be located in the first floor mechanical room. Heating water piping shall be provided along with all required equipment, pumps, valves, and other equipment and instruments to provide a functional and properly operating system. Two heating water pumps shall be provided each sized at 115% of the flow requirement. Freeze protection shall be provided by the use of a glycol-feed system. The system shall have a concentration of 35% propylene glycol.

New Direct Digital Controls shall be provided for all new HVAC systems and equipment. All systems shall be capable of being monitored and controlled through a connection to the building system. Provide cybersecurity in accordance with specification 01 35 13 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS for all systems that meet the definition of an industrial

control system (ICS), SCADA or facility related control system (FRCS).

1.9.2 FIRE SUPPRESSION SYSTEM AND SMOKE DETECTION

See section 01 86 13.

1.10 VENTILATION AND EXHAUST SYSTEMS

The design of all systems shall comply with the ASHRAE Handbooks, ASHRAE Standard 62.1, NFPA 90A, NFPA 90B, and NFPA 91, and shall meet the requirements of the ODDG. Ventilation cooling shall only be utilized if interior temperature exceeds exterior temperature except in instances when continuous exhaust/ventilation is required by code.

1.10.1 Intake, Relief and Exhaust Requirements

Outside air intakes shall be located in areas where potential for air contamination is lowest, and shall be located at least 10 feet above the adjacent finished grade. Motorized insulated low-leakage dampers with blade and jamb seals shall be provided at all outside air intake and exhausts. The maximum leakage rate permitted for outside air intakes shall be based upon UFC 3-410-01. Louvers shall be of the storm/drainable type and shall be AMCA certified. Louvers shall be selected based on the following criteria: maximum free area face velocity of 800 feet/min; maximum pressure drop of 0.1 in W.C.; and a water penetration of less than 0.01 oz/square foot.

1.11 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS

Testing, adjusting, and balancing shall meet the requirements of the ODDG. The work required by this Section shall be complete, including all test and inspection reports, before starting the commissioning functional testing.

1.11.1 Balancing Firm Qualifications

TAB shall be performed by an independent firm, hired directly by the Design Build Contractor only, using certified technicians under the direct supervision of a registered engineer. Technicians shall be certified by the National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC). The firm shall select AABC MN-1 or NEBB-01 as the standard for providing TAB of the mechanical systems.

1.11.2 Balancing, Commissioning and Integration

Design Build Contractor shall include additional time required for full balancing and commissioning once the construction of all systems are complete. Commissioning shall meet the requirements of UFC 1-200-02 and other applicable criteria.

1.11.2.1 PLUMBING SYSTEM CRITERIA

All plumbing fixtures and piping shall comply with UFGS Section 22 00 00 PLUMBING GENERAL PURPOSE, UFC 3-420-01 and the 2018 International Plumbing Code.

1.12 INSTRUMENT AND CONTROL

The instrumentation and control shall meet the requirements of UFC 3-410-02. The equipment shall be capable of being monitored and controlled through the Installation wide UMCS. System integration shall include developing interfaces for each piece of equipment and provide a graphical representation of the equipment and control menu screen. Historical data for equipment, buildings, and systems shall be stored for use in determining system maintenance and equipment operation. System integration shall include developing algorithms, analog, and discrete logic to fully automate the starting and stopping of all system equipment. The logic shall also provide for manual operator override, set point adjustments, and control loop adjustments.

1.12.1 Controls Equipment

Packaged equipment shall be provided with dedicated controls that shall interface to the building control system through communication links (Lonworks). The Design Build Contractor shall provide as many control cabinets as required for a complete design. Provide new cable, conduit and switches as necessary for a complete system. HVAC control system panels shall be provided in the mechanical equipment room; the number and size of panels shall be dictated by the equipment to be installed in the panels.

The Design Build Contractor shall develop and integrate automated algorithms in the control system which will select equipment for operation based on the load, daily environmental conditions, time of day, day of week, and building load requirements. The equipment selection shall be based on the most economical and efficient to meet the system load requirements.

1.12.2 Controls Commissioning and Integration

Design Build Contractor shall include additional time required for full controls integration and commissioning.

1.13 OPERATION AND MAINTENANCE REQUIREMENTS

Facility Operation and Maintenance (O&M) Manuals, including associated Training Course and Training Manuals, shall be provided for the mechanical systems and shall meet the requirements of the individual Unified Facilities Guide Specifications (UFGS) Sections.

1.13.1 Facility Operation and Maintenance Manuals

The intent of the O&M Manuals is to promote and maximize the efficiency, economy, safety, and effectiveness of the life cycle operation, maintenance, and repair of the facility. Comprehensive, self-contained manuals shall include all of the identified building's interior systems, plus the exterior portions of systems that support the building. Draft O&M Manuals are required to be delivered a minimum of seven days prior to O&M systems training.

1.13.1.1 Technical Writer Qualifications

Obtain the services of a firm experienced in technical writing to prepare the Operation and Maintenance Manuals.

1.13.2 Operation and Maintenance Training Course and Manuals

A training course shall be conducted for designated personnel in the maintenance and operation of all systems specified. The training course shall cover all of the items contained in the O&M Manuals.

1.14 TECHNICAL SPECIFICATIONS

Government provided Unified Facility Guide Specification (UFGS) shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product and installation requirements for the facility. The specifications shall not be edited to reduce the level of quality for equipment, services provided, or materials. The specifications shall be edited in accordance with the designer notes associated with each specification and with the Specification Requirements (Division 01 General Requirement Specifications). In case of a conflict, the criteria found in the Specification Requirements (Division 01 General Requirement Specifications) shall take precedence. The provided specifications define the minimum requirements for items of equipment, materials, installation, training, operating and maintenance instructions, O&M manuals and testing that shall be provided for the facility. Where items of equipment, materials, installation, training, operating and maintenance instructions, O&M manuals or testing requirements are not specified in the provided specifications, special paragraphs within each applicable guide specification shall be prepared to specify those items. Government approval is required for any addition of materials, equipment, or installation requirements not covered in the guide specifications. Specific items of equipment identified in the provided specifications but not required for the facility shall be edited out.

1.15 TRAINING

Training courses shall be conducted for 2 operating staff members designated by the Contracting Officer in the maintenance and operation of all systems. Two-week notice shall be given to the Contracting Officer for start of training. A training day is defined as 2 hours of classroom instruction, including breaks and lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, assume that the attendees will have a high school education or equivalent, and are familiar with the systems. No training shall be scheduled until training manuals and O&M manuals have been approved by the Government. A minimum of 2 manuals for the facility shall be given to the Contracting Officer to turnover to the Directorate of Public Works.

1.15.1 Training Course Content

The courses shall be taught at the project site or other location within Fort Carson. The proposal shall describe the training plan and expected number of days for training to occur. The training courses shall cover all the material contained in the Operating and Maintenance Instructions, and O&M manuals the layout and location of each system and shall include the following for each system:

- a. Troubleshooting
- b. Diagnostics

- c. Calibration
- d. Adjustment
- e. Commissioning
- f. Repair procedures

Typical systems and similar systems may be treated as a group, with instruction on the physical layout of one such system. The results of the performance verification tests and the calibration, adjustment and commissioning reports shall be presented as benchmarks of the system(s) performance by which to measure operation and maintenance effectiveness. Draft or completed O&M Manuals shall be used during training.

1.16 BALANCE OF EQUIPMENT AND MATERIALS

Equipment and materials to achieve a complete balance of the system not detailed in this specification such as, but not limited to, valves, fittings, heat exchangers, pumps, insulation, etc., shall be selected to meet SECTION 1.2 GENERAL REQUIREMENTS, applicable codes and standards, and provide a beneficial life cycle cost.

PART 2 NOT USED

PART 3 NOT USED

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SECTION 01 86 13

FIRE PROTECTION REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications are referred to in the text by the basic designation only. The most current edition shall be used whenever a specific edition is not mentioned.

ASTM INTERNATIONAL (ASTM)

ASTM E 84	(2022) Standard Test Method for Surface Burning Characteristics of Building Materials
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INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2021) International Building Code
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1	Fire Code
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signaling Code
NFPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 101	Life Safety Code
NFPA 291	Recommended Practice for Fire Flow Testing and Marking of Hydrants
NFPA 855	Standard for the Installation of Stationary Energy Storage Systems
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systemse

U.S. DEPARTMENT OF DEFENSE (DoD)

UFC 1-200-01	DoD Building Code
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems
UFC 4-021-01	Design and O&M: Mass Notification Systems
UFC 4-021-02	Electronic Security Systems
TSFPEWG G 3-600-01.01-18	Air Force Fire Protection Engineering Criteria and Technical Guidance for Mission Continuity of Electronic, Information Technology, and Telecommunications Equipment Installations
ECB 2018-17	(2018 Revision 1) New Requirements for Visual Notification for Mass Notification Systems

This project is located at Grand Forks Air Force Base, North Dakota, for the Building 631 renovation project. Any new egress, suppression system (sprinklers), and alarm and mass notification systems shall meet the requirements stated herein. Fire protection shall be based on sound fire protection engineering principles and shall give safeguards against loss of life and property by fire, consistent with the mission, risk involved, and economical utilization. A Life Safety/Building Code analysis shall be provided by the Fire Protection Engineer for each facility. At final submission, the Fire Protection Engineer shall stamp and seal the Life Safety/Building Code plans. Fire protection criteria shall also be based on the codes listed above and on the following code requirements:

ADA and ABA Accessibility Guidelines for Buildings and Facilities
(www.access-board.gov/ada-aba/final.cfm)

Omaha District Design Guide (July 2019)

Building type specific criteria is listed below. The requirements of these criteria documents shall be met, except as modified by these specifications. Refer to 01 81 00 for each building type and requirements including prototype references, etc. The following buildings are part of the scope of work:

Building 631
Communication Hut

Criteria for facilities can be found on the Whole Building Design Guide (WBDG) website (<https://www.wbdg.org/Prototypes>, UFCs, ECBs, etc. are located on this website.

All requirements of the latest aforementioned codes shall be incorporated into the designs. A Fire Protection Engineer shall be part of the design team in accordance with UFC 3-600-01 and shall be a single person. The Fire Protection Engineer shall provide a Life Safety Code Analysis and Building

Code Analysis of each new facility as well as be responsible for the designs of all of the new fire alarm, fire sprinkler, and mass notification systems. At 100% design submission, the Fire Protection Engineer of Record shall submit a letter to USACE certifying all of the projects meet all of the mentioned codes, and NFPA 101 criteria.

The Life Safety Code

NFPA 101 relative to the designs shall give special attention to the application of fire codes as they relate to Life Safety. Features of fire protection based on the following shall be included in the design: Automatic operating devices; Exiting for inhabitants and the protection of egress components; Personnel safety in hazardous areas; Appropriate ratings of fire and smoke partitions, doors and windows; Travel distances; Common paths of travel; Occupancy types; Hazard of occupancies and their contents; and Isolation from the remainder of the facility.

Applicable requirements of the International Building Code shall also be included in the design. These shall include the following: Types of construction; Fire area limitations; Increases to allowable floor areas; and Separation of structures.

All military construction must comply with the code requirements set forth in UFC 1-200-01, UFC 4-010-06, UFC 4-021-01, UFC 3-600-01, and Air Force TSFPEWG G 3-600-01.01-18. Additional guidance and design criteria includes NFPA 1, NFPA 10, NFPA 13, NFPA 20, NFPA 24, NFPA 70, NFPA 72, NFPA 90A, NFPA 101, NFPA 291, NFPA 855, NFPA 2001, and ECB 2018-17.

All fire protection designs shall be done by a Fire Protection Engineer in accordance with UFC 3-600-01. Refer to section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEMS for additional information regarding qualification requirements for the fire alarm and mass notification systems designer. The fire protection engineer shall perform a Life Safety/Building Code analysis for each of the facilities and structures including egress capacity and pathways. At final submission, the Life Safety/Code Analysis shall be stamped and sealed by the Fire Protection Engineer of Record for each facility and structure. The life safety analysis shall be submitted with the first submittal for each facility and structure for review. Life safety analysis shall comply with UFC 3-600-01 and NFPA 101. The new floor plans shall be evaluated for compliance with NFPA 101. The life safety and building code plans in the Request for Proposal (RFP) are for reference only. A life safety analysis and building code analysis is required to be provided as part of the project by a Fire Protection Engineer.

1.2 OCCUPANCY FOR THE PROJECT

The facility will be classified in accordance with NFPA 101. According to Chapter 3 and Chapter 4 of the International Building Code (IBC), the facility will be classified as part of the Life Safety Code and Building Analysis. Review all applicable occupancies such as assembly, storage, industrial, and business occupancies.

1.3 CONSTRUCTION PER 2021 INTERNATIONAL BUILDING CODE (IBC)

Construction type of the facility shall be a minimum of Type IIB. The hourly fire rating requirements for walls and columns for each of the building systems and components shall not be less than those specified in the performance specifications sections of IBC.

1.4 CORRIDORS

Review NFPA 101 to determine fire rating of all corridors and exits.

Separation of incidental use areas shall be provided per NFPA 101. Corridors on the first floor leading from the egress stairs shall be fire rated to 1 hour construction and also be a smoke barrier.

1.5 INTERIOR FINISHES

Interior wall and ceilings of all exits shall be in accordance with NFPA 101. Review based upon occupancy.

Interior floor finishes in all exits shall be in accordance with NFPA 101. Review based upon occupancy.

No downgrade in finish Class due to complete coverage by an automatic sprinkler system shall be allowed.

1.6 EGRESS CAPACITY:

Egress capacities shall be in accordance with NFPA 101 and included as part of the scope of work and Life Safety Code Analysis.

1.7 MEASUREMENT OF TRAVEL DISTANCE TO EXITS:

NFPA 101, SEC 7.6 - Review as part of the Life Safety Code Analysis. Maximum distance shall be based upon most stringent occupancy requirements in NFPA 101 for each facility and structure.

1.8 FIRE EXTINGUISHER CABINETS:

NFPA 10 - Review as part of the Life Safety Code Analysis. Provide in all areas of the building.

1.9 AUTOMATIC SUPPRESSION SYSTEMS:

Demolition: Demolish and remove the existing sprinkler system in its entirety except in the Mechanical Room where the riser is located. Demolish and remove all sprinkler heads, valves, tamper switches, flow switches, and distribution piping from both floors. The main riser shall remain as well as the water service entrance.

New: Provide a clean agent suppression system for any IT or Electrical Room designated as noted on the plans and in the Room Data Sheets. Provide all fire walls, smoke exhaust, fire detection, clean agent suppression system, sprinkler system, and all other requirements per TSFPEWG G 3-600-01.01-18. Only UFGS fire suppression specifications shall be edited and used for this system (Section 21 22 00.00 40). Provide clean agent suppression systems for each server room that is used for the simulators. Comply with NFPA 2001. The clean agent suppression system is in addition to a wet pipe sprinkler system. Each wet pipe sprinkler system for the servers shall have a separate feed from the riser with a control valve for each room. Provide high temperature heads in these rooms (200 deg. F). Provide a very early smoke detection system for each room. Refer to fire alarm paragraphs.

New: Provide new sprinkler system for the building. Provide areas and

densities per UFC 3-600-01 and per the RFP drawings Provide pre-action sprinkler system for any areas subject to freezing. Provide a new double check valve assembly on the riser if one is not present. Provide a forward flow test assembly for the new back flow prevention device if one is not there. Systems shall be designed per UFC 3-600-01. Also, provide fire sprinkler systems for any overhangs, canopies, or storage areas where required by NFPA 101 or UFC 3-600-01. Hydraulically calculate each new system per NFPA 13. Obtain a current fire hydrant flow data for the design of the new system in accordance with NFPA 291. A structural engineer shall be part of the contractor's design team. The structural engineer shall review all piping supports for the facility. The new sprinkler systems shall not overload the building's structural capacity. Only UFGS fire suppression specifications shall be edited and used for this project (Section 21 13 13, 21 13 16, 21 13 18, etc.). Provide di-electric breaks for any sprinkler piping penetrating the secure area walls. Refer to Architectural Plans for those wall locations. Provide concealed sprinkler heads for the Sim Rooms 107, 108, 109, 116, 117, and 118.

1.10 PRESENCE OF DISABLED OCCUPANTS

Disabled personnel will potentially be present. Provisions for accessibility and usability will be made for physically handicapped individuals for exiting these facilities. Refer to Paragraph 1.12 for fire alarm system requirements.

1.11 FUNCTIONAL AND TECHNICAL REQUIREMENTS

1.11.1 Building Construction Type

These facilities shall comply with a minimum Construction Type IIB, in accordance with ICC IBC. Review as part of the Life Safety/Building Code Analysis. Downgrading of the structure's construction type is not allowed.

1.11.1.1 Exterior Walls

Exterior walls of each of the facilities and structures will not be rated as long as minimum distances from other buildings are maintained and the area and size of the structure does not require it per IBC. Review as part of the Life Safety/Building Code Analysis. Standoff distances shall be maintained for explosives and high hazard occupancies. Review and show on site plans any explosive impact standoff distances.

1.11.1.2 Roof

Each building's or structures's roof covering shall be in accordance with UFC 3-600-01. Review as part of the Life Safety/Building Code Analysis.

1.11.1.3 Interior Walls

All penetrations in fire and smoke rated walls (conduits, pipes, cable trays, etc.) shall be fire or smoke stopped according to their respective wall/floor/ceiling rating at each penetration. Review all building walls as part of the Life Safety/Building Code Analysis and provide smoke and fire rated walls as necessary as part of NFPA 101 and 3-600-01. Provide a 1 hour fire rated walls for the corridors serving the interior egress stairs. Corridor walls shall be fire rated and a smoke barrier Fire rated walls in the facility shall be a UL listed one hour fire rated assembly (1 hour fire rated wall). Fire rate any walls serving spaces identified as IT Rooms, Electrical Rooms, or as noted on the plans and in the Room Data

Sheets where clean agent suppression systems are being provided.

1.11.1.4 Interior Finishes

Interior finish materials on walls, ceilings, partitions, and furnishings of all types in all exits shall be as defined in NFPA 101. All other areas will have interior finish materials for walls, ceilings, and furnishings as required by NFPA 101. Smoke Developed Ratings will not exceed 450 for Class A, Class B, Class C materials when tested in accordance with ASTM E 84 in accordance with UFC 3-600-01.

Provide self-closing hardware and gasketing at all fire-rated doors as well as smoke rated doors.

1.12 FIRE ALARM AND DETECTION SYSTEMS

Demolition: Demolish and remove all of the fire detection, alarm, and mass notification system throughout the facility.

New: Installation of the Fire Alarm and Mass Notification Systems shall require a Certification and Accreditation to be obtained, refer to section 01 86 29 COMMUNICATIONS REQUIREMENTS for additional information.

1.12.1 New: Fire Alarm and Mass Notification Panels

Provide the facility with a new Monaco addressable fire alarm, detection, and mass notification system and panel (FACP). All new circuits to the addressable type fire alarm systems shall comply with NFPA 72, UFC 3-600-01, and NFPA 101. Contractor shall install new detectors and initiating devices as required. Provide appropriate interfaces at the new panels to allow all new alarm detection, new fire alarm devices and new initiation devices to be connected to the addressable panel. System shall meet the Grand Forks Air Force Base Requirements and all other applicable standards. Grand Forks AFB requires the use of Monaco Fire Alarm systems. Provide new transmission devices to send fire alarms and mass notifications signals to the receiving equipment located at the base fire department. Provide single Fire Alarm (FA) and Mass Notification System (MS) Strobe and LED text signs in accordance with ECB 2018-17: New Requirements for Visual Notification for Mass Notification Systems.

The system shall be addressable to each reporting device and with turnkey MNS. MNS devices shall be combination speaker/strobe on ceilings or walls. The system shall be complete with the new control panels in the building and required devices. The addressable system shall transmit and receive addresses and data between the control panel and the new devices. Comply with UFC 4-021-01 and ECB 2018-17 for all aspects of the Mass Notification System. New fire alarm and mass notification system shall be provided for the facility and shall integrate with the existing Grand Forks AFB base-wide system. Existing Fire Alarm receiving station on Grand Forks AFB is Monaco D21.

For any room designated as requiring a clean agent suppression system on the plans or in the Room Data Sheets, provide a Very Early Smoke Detection Apparatus (VESDA) Aspirating system. VESDA system shall send a signal to the releasing panel. Provide a releasing panel for the clean agent suppression system. Provide in compliance with the requirements of TSFPEWG G 3-600-01.01-18 for IT Rooms. Provide VESDA systems for each of the server rooms of the simulators.

1.12.2 Initiating and Notification Devices

The new system shall include addressable manual pull stations, addressable heat detectors, addressable duct smoke detectors, addressable spot type smoke detectors, and audible and visual notification appliances that comply with ADA requirements.

1.12.3 Mass Notification System

Provide edited UFGS Specification 28 31 76. Design shall be per UFC 4-021-01 and ECB 2018-17 for the Mass Notification System(s). Provide a new Mass Notification System for the building. Per UFC 4-211-01 Section 3-8.2, provide a Public Address (PA) system with coverage to all areas of the facility. Provide a complete and functioning integrated public address system. Coordinate the PA system with the activities. Integrate the PA system with the MNS per UFC 4-021-01. Interface the PA system with the telephone system such that the telephone system provides access to the PA system.

1.12.4 Interfaces to Other Systems

The new system shall shut down appropriate air handling equipment, smoke dampers, and release magnetic door holding devices, and shall hold on lighting controlled by automatic means in the egress paths per NFPA 101 as necessary for proper operation of the facility. Provide a "Sequence of Operations Matrix" to coordinate with alarm functions in Section 28 31 76 ADDRESSABLE FIRE ALARM AND MASS NOTIFICATION SYSTEMS for the facility. The "Sequence of Operations Matrix" shall be approved by the Contracting Officer. The system shall meet requirements of UFC 4-021-02, if applicable.

1.12.5 Layout Considerations

Duct smoke detectors shall be provided on all new air handling supply fans over 2000 CFM, and all new return fans over 15,000 CFM. Smoke detectors, shall be provided where electromagnetic door holders are used. Audible and visual notification appliances shall be provide to meet these specifications. This includes all new interior egress doors. Designs shall comply with ADA Requirements, NFPA 101 and NFPA 72. Provide an audible notification appliance on the exterior at each exit door. Addressable initiating device circuits modules shall be provided for each non-addressable device, excluding notification appliances. Visual strobes shall be located in every space within the building.

1.13 FIRE PROTECTION SPECIFICATIONS (SUBMITTALS AND ACCEPTANCE TESTS)

The sprinkler and fire alarm submittals shall be reviewed and approved by the Base Fire Chief or designated representatives as well as USACE Omaha District Fire Protection Engineer. Only UFGS fire alarm and fire suppression specifications shall be edited and used for this project. All submittals shall be stamped and sealed by a Registered Fire Protection Engineer.

Representatives of the Base Fire Department shall inspect and witness all final acceptance testing prior to the Contracting Officer accepting the sprinkler and fire alarm systems.

Fire water services shall be installed and tested in accordance with NFPA 24 guidelines. Fire sprinkler systems shall be tested in accordance

with NFPA 13 guidelines. Fire alarm and mass notification shall be tested in accordance with NFPA 72 guidelines.

1.14 DESIGN OBJECTIVES AND PROVISIONS

1.14.1 Zoning and Treatment of Each Potential Hazard

1.14.1.1 Limiting Fire Spread

Every horizontal opening and hazardous locations as defined by NFPA 101.

1.14.2 Provision and Maintenance of an Unobstructed Emergency Egress System

All corridor widths, clear space requirements relative to exit doors, etc., shall be in accordance with the Uniform Federal Accessibility Standards and the Americans with Disabilities Act for unobstructed egress. Emergency lighting shall be installed in accordance with NFPA 101.

1.14.3 Maximum dead ends.

Maximum dead ends shall be as per NFPA 101 based upon most stringent occupancy requirements. Verify as part of the Life Safety/Building Code Analysis.

1.14.4 Egress locations

All egress locations shall be marked with exit signs per NFPA 101. Review as part of the Life Safety/Building Code Analysis.

1.14.5 Outside Exit Doors

All outside exit doors shall swing in the direction of exit travel. Outside exit doors shall be equipped with panic hardware mounted 44 inches above the finish floor and have a minimum clear width of 34 inches to allow for egress. Exit doors requiring security hardware shall be reviewed as part of the Life Safety/Code Analysis. Review per NFPA 101.

1.14.6 Required Fire Exits

All required fire exits from the building shall lead to a public way or to a clear safe area at a minimum distance of 75-feet from the the building with sidewalks.

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CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS

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. AIR FORCE (USAF)

AFMAN 14-403	(2019) Sensitive Compartmented Information Security and Intelligence, Surveillance, And Reconnaissance Systems Cybersecurity and Governance
DAFGM 2022-32-01	(2022) Department of the Air Force Guidance Memorandum, Civil Engineer Control Systems Cybersecurity
AFI 16-1406	(2020; Volume 2) National Industrial Security Program: Industrial Security Procedures for Government Activities
AFI 10-1701	(2014) Command and Control (C2) For Cyberspace Operations
AFI 17-1303	(2020) Air Force Cybersecurity Workforce Improvement Program
AFMAN 17-130	(2020) Cybersecurity Program Management
AFPD 17-1	(2016) Information Dominance Governance and Management

U.S. Code (USC)

Tile 44 Chapter 35	(2014 and subsequently to 2022) Federal Information System Modernization Act
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U.S. DEPARTMENT OF DEFENSE (DOD)

DODI 8551.01	(2014 with Change 1, 2017) Ports, Protocols, and Services Management (PPSM)
DTM 08-060	(2008) Policy on Use of Department of Defense (DoD) Information Systems - Standard Consent Banner and User Agreement
DODI 8500.01	(2014; with Change 1, 2019) Cybersecurity
DODD 8510.01	(2022) Risk Management Framework (RMF) for DoD Information Technology (IT)

DOD 8510.01	(2022) Risk Management Framework (RMF) for DoD Systems
DOD 8570.01-M	(2005; Change 4 11-2015) Information Assurance Workforce Improvement Program
DODD 8140.01	(2020) Cyberspace Workforce Management
DODI 8531.01	(2020) Department of Defense Vulnerability Management
UFC 4-010-06	(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST FIPS 140-2	(2001) Security Requirements for Cryptographic Modules
NIST FIPS 140-3	(2019) Security Requirements for Cryptographic Modules
NIST FIPS 201-2	(2013) Personal Identity Verification (PIV) of Federal Employees and Contractors
NIST FIPS 201-3	(2022) Personal Identity Verification (PIV) of Federal Employees and Contractors
NIST SP 800-82	(2015; Rev 2) Guide to Industrial Control Systems (ICS) Security
NIST SP 800-53	(2020; Rev 5) Security and Privacy Controls for Federal Information Systems and Organizations
NIST SP Series 800	Special Publications Series 800, and other NIST publications as applicable to the project

1.2 DEFINITIONS

Facility Related Control Systems (FRCS) are systems integral to real property which implement control through the use of operational information technology to ensure the security and protection of real property, life safety, and comfort of occupants; enhance efficiency and lower facility costs; monitor and record process data; used for manufacturing, product handling, production, and control of geographically dispersed assets; and are automatic with varying degrees of human/manual intervention for operation where real property is of a permanent and immovable nature, and may consist of utilities, campuses, and structures.

The NIST Risk Management Framework (RMF) provides a comprehensive, flexible, repeatable, and measurable process for managing information security and privacy risk for systems to meet the requirements of the Federal Information Security Modernization Act (FISMA).

The Information System Security Manager/Officer (ISSM/ISSO) for Cybersecurity will be the individual who ensures the appropriate

cybersecurity controls are implemented in accordance with the acceptable risk. The System Owner (SO) is the individual who utilizes the FRCS or the individual who operates and maintains the system. The SO may be a User or the Maintenance Shop.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" 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

Cybersecurity Subject Matter Expert (Qualifications); G, DO

Contractor Personnel Requirements; G, DO

Contractor Computer Cybersecurity Compliance Statements; G, DO

Contractor Temporary Network Cybersecurity Compliance Statements; G, DO

SD-02 Shop Drawings

MANUFACTURER DOCUMENTATION; G, DO

TESTING AND COMMISSIONING REQUIREMENTS; G, DO

1.4 SCOPE OF WORK

Comply with NIST FIPS 140-2, NIST FIPS 201-2, NIST SP 800-82, NIST SP 800-53, DODI 8551.01, DTM 08-060, DODI 8500.01, DOD 8510.01, DOD 8570.01-M, DODD 8140.01, DODI 8531.01, UFC 4-010-06, AFMAN 14-403, DAFGM 2022-32-01, AFI 16-1406, AFI 10-1701, AFI 17-1303, AFMAN 17-130, DAFGM 2021-01, AFD 17-1.

Refer to Section 01 81 00 for description of the project and overall scope of work.

All planning, design, and construction of FRCS for existing and new facilities including integration into existing control systems shall be done in accordance with the requirements set forth. The following is a non-comprehensive list of potential FRCS:

Electronic Security Systems (ESS) which include Intrusion Detection Systems (IDS), Access Control Systems (ACS), and Video Monitoring Systems/Closed Circuit TV (CCTV)

Fire Protection Life-Safety Systems which include Fire Alarm Reporting System (FA), Fire Suppression System, Mass Notification System (MN)

Building (Level) Automation System (BAS) which includes Heating, Ventilation and Air Conditioning Systems (HVAC)

Energy Monitoring and Control System (EMCS) and Utility Monitoring and Control System (UMCS)

Fuel Control Systems

Building Lighting System (UFC 3-530-01) and Receptacle Control System

Airfield Lighting Systems

Elevators

Cranes

Variable Frequency Drives

Automated Rollup Doors

Automated Window Shades

Bullet Collection Systems

Automated Targeting Systems for Shooting Ranges

Impressed-Current Cathodic Protection Systems

Electrical Distribution System (Exterior and Interior) with micrologic processors

Generator, Controller, Automatic Transfer Switch and Uninterruptible Power Supply

Utility Metering System (Advanced Meters, AMI, etc.)

LED Marquee Systems when connected to process controllers

Public Address System (PA)

Audio/Visual Systems (A/V)

Supervisory Control and Data Acquisition (SCADA) Systems

Gate Controllers

Irrigation Controllers

Other FRCS as defined by Project Requirements, and not specifically identified. Any system or component of a system which has wireless, radio frequency (RF), bluetooth, and/or network communication capabilities, and/or a port for connecting a laptop/computer.

1.5 RELATED SECTIONS

The following are related Sections which apply to this Section and vice versa:

1. SECTION 01 81 00 - SUMMARY OF WORK
2. SECTION 01 82 00 - ARCHITECTURAL REQUIREMENTS
3. SECTION 01 84 00 - INTERIOR DESIGN REQUIREMENTS
4. SECTION 01 86 10 - MECHANICAL REQUIREMENTS
5. SECTION 01 86 13 - FIRE PROTECTION REQUIREMENTS
6. SECTION 01 86 26 - ELECTRICAL REQUIREMENTS
7. SECTION 01 85 29 - COMMUNICATIONS

- 8. SECTION 01 89 00 - SITE WORK REQUIREMENTS
- 9. SECTION 01 91 00.15 20 - TOTAL BUILDING COMMISSIONING

Review all related sections, in addition to the above listed, to capture all potential FRCS which would be included in project.

1.6 Common Criteria for IT Security Evaluation

Hardware and software products for systems networking shall be evaluated and accredited at a licensed/approved evaluation facility and listed as being in conformance to the Common Criteria for IT Security Evaluation (ISO Standard 15408, visit <https://www.niap-ccevs.org> for more information); products shown to be in the evaluation process for this purpose are acceptable. Where applicable to the device(s) and where the device(s) are capable, if multiple versions of hardware exist, devices supporting encryption must be considered first; if additional licenses are required for encryption, those licenses must be obtained as well. If encryption is either not applicable or the Device(s) are not capable, provide documentation as such.

1.7 Cybersecurity Subject Matter Expert (SME)

Cybersecurity Subject Matter Expert (Qualifications): Provide the services of a cybersecurity SME. All certifications must be in effect and current at the time of the resume submission. The individual shall oversee all work within this section and the UFGS section 25 05 11 specifications. The Cybersecurity Subject Matter Expert must meet Information Assurance Manager Level II Certification requirements in accordance with DOD 8570.01-M Information Workforce Improvement Program. The individual shall have experience with the Risk Management Framework (RMF) process. Facility related control system (FRCS) and industrial control system (ICS) knowledge is required through demonstrated control system design, testing, and commissioning experience.

1.8 Contractor Personnel Requirements

All Contractor Personnel requesting access to the project site and existing systems for the purpose of installing new control system devices/software, programming/configuring of control system(s) devices/software, or modifying code for existing control system(s) devices/software are required to have a favorable security background check.

1. Contractor Personnel who require access to government IT and/or government control systems must be determined to be trustworthy by designated Government official prior to grant of IT access in accordance with all applicable policies and regulations.
2. Individuals developing or using Security Controls documentation, or other documents that are designated "Controlled Unclassified Information" (CUI), will be required to complete and submit a signed Non-Disclosure and Data Handling Agreement for CUI information and must submit completed DoD CUI Mandatory Training at <https://www.dodcui.mil/Home/Training/> no less than 30 days prior to base access.
3. Complete and sign/submit the SCADA Change Request Form (as needed).
4. Complete and sign/submit the ICS SAAR-N Systems Access

Authorization Request Forms (as needed).

5. Complete and sign/submit the ICS IA Addendum (as needed).
6. Complete and sign/submit the ICS Privileged Access Form (for elevated privileges, such as for administrator or programmer tasks) (as needed).

PART 2 PRODUCTS

All products used on this project must meet the indicated requirements unless otherwise noted.

2.1 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with contract requirements will be accepted.

2.2 Supply Chain Risk Management (SCRM)

Receipt of gray market or counterfeit items poses a risk to the DoD systems and the accreditation of that system. Following SCRM practices during the procurement process reduces the risk associated with receipt of gray market or counterfeit equipment and components. Best practices of SCRM must be implemented when procuring FRCS equipment and components. Equipment and components must be procured through authorized Original Equipment Manufacturer (OEM) channels or authorized U.S. distributors. Vendors must guarantee that OEM equipment does not contain third-party parts or components.

2.3 Legacy Products

All provided equipment and software must be currently marketed products, not currently scheduled for end of life or obsolescence, to ensure system sustainability. Where older versions of software are provided due to incompatibility concerns between different versions, provide the Government with the means (licenses, install disks, and any other installation materials) to fully update the provided software to the latest marketed version.

Existing legacy devices which are not required in the new system configuration must be disconnected, removed, and turned over to the Government unless otherwise directed by the Government.

2.4 Unified Capabilities Requirements

Products which fall under the scope of the Unified Capabilities Requirements must be listed in the Department of Defense Information Network (DoDIN) Approved Products List (APL) (<https://aplists.disa.mil/apl>). Coordinate with the Contracting Officer Representative for obtaining the list(s).

PART 3 EXECUTION

3.1 FRCS Inventory List

Identify all control systems which utilize or have the potential to utilize operational information technology (OIT) for functionality (FRCS) and provide an inventory list to begin the Risk Management Framework (RMF) process.

3.2 ISSO/ISSM and SO

The ISSM/ISSO for cybersecurity at the Installation is:

Coordinate with the ISSM/ISSO and System Owner(s)(SO) through the Contracting Officer Representative for all FRCS cybersecurity work on this project.

3.3 C-I-A IMPACT LEVEL RATINGS

Preliminary categorization for this facility is presumed mission critical until the FRCS have been identified and the Information System Security Manager/Officer (ISSM/ISSO) communicates the mission category and associated C-I-A Impact Level Ratings for the identified systems. Refer to "Distribution of the FRCS Master List Memo - signed 7_16_21" and "Addendum - FRCS Master List Update 7_16_21". The Confidentiality-Integrity-Availability (C-I-A) Impact Level Ratings may be taken from the FRCS Master List as preliminary until all of the FRCS has been inventoried, and the respective System Owner (SO) is identified, and able to provide the respective C-I-A impact level ratings in accordance with UFC 04-010-06. Except as explicitly indicated, wireless and plug-and-play controls shall not be used. At minimum, UFC 4-010-06 Paragraph 3-1.1 Steps 1 through 4 shall be completed for the interim design review for review and further input from the System Owner (SO) and the ISSM/ISSO. Steps 1 through 5 shall be completed for the 100 percent design review. All communications with the SO and ISSM/ISSO shall be through the USACE Contracting Officer Representative (COR).

3.4 Specifications

UFGS Section 25 05 11 "Cybersecurity for Facility-Related Control Systems" and related materials shall be utilized and are found at the following location:

<https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-25-05-1>

Provide an edited specification 25 05 11 variant as appropriate for each control system platform or enclave inventoried. Editing of a related specification section which identifies the requirements for the control system or component is an acceptable alternative.

3.5 Outages

Existing basewide systems for which any new systems connect must remain operable, and services must not be interrupted during the construction process to the greatest extent possible unless otherwise indicated. Coordinate construction phasing in the project schedule/connection or tie-in plan and safety plan with the Government and the system operator for approval prior to start of construction.

3.6 Access to Existing Systems

Systems may be located within controlled access areas. Access request procedures and requirements for access must be followed for these locations. Escorts may be necessary in many if not all circumstances. The Contractor will be responsible for coordinating access and escorts with the Government.

The Government must be afforded the ability to monitor and witness all installation, testing, and on-site configuration/programming work in secure areas.

3.7 Network Security Requirements

Access to existing systems is not permitted without the individual's consent to a system use agreement. In general, no applications may be installed on Government systems without explicit request and Government approval. Government systems and systems provided to the Government must not be outfitted with hardware or software "back doors" to permit remote access. Use of flash memory devices (including USB "thumb" drives) on Government equipment is also prohibited. Information used during systems implementation must be designated "Controlled Unclassified Information" (CUI) and must not be disseminated without written authorization from the Contracting Officer.

3.8 Contractor Laptops

For installations which do not intend to integrate new FRCS with any existing FRCS with an Authorization to Operate (ATO), or where new FRCS will be programmed prior to integration, contractor laptops may be used but must be validated, scanned for vulnerabilities, and approved by AFCEC prior to usage.

For any new FRCS that requires configuration while already integrated to an existing FRCS with an ATO, a Government laptop belonging to the accreditation boundary of that existing FRCS must be utilized for programming and configuration. Coordinate with AFCEC through the Contracting Officer Representative to check-out appropriate laptop.

3.9 MANUFACTURER DOCUMENTATION

Provide all Existing Manufacturer Documentation related to cybersecurity certificates of compliance, compliance statements, and cybersecurity controls implementation completed on each respective system.

3.9.1 Configuration Management Plan

Provide all information required to verify and test all patches and upgrades prior to deployment, including resources, capabilities, and coordination as required with any test procedures run at manufacturer/vendor labs.

3.9.2 Manufacturer Recommended Security Requirements

Provide the following:

- a. List with discussion of all security features of Vendor hardware and software.
- b. Documentation of mobile code (if used) (e.g., scripts, such as Java) and

protections in place to prevent malicious content from using associated runtime systems, where applicable.

- c. Documented FIPS 140-2 validated cryptography (or equivalent) compliance, if/where applicable.

3.9.3 Manufacturer Recommended Vulnerability Management Plan

Provide documentation of any security issues associated with implementation and maintenance of the application. Include in the documentation the Manufacturer/Vendor Cybersecurity Point of Contact for resolution of cybersecurity issues post accreditation.

3.9.4 Manufacturer Recommended Maintenance Plan

Provide names and other required information of personnel who will be authorized to perform maintenance in accordance with maintenance agreement(s).

3.10 TESTING AND COMMISSIONING REQUIREMENTS

a. Provide AFCEC with the System(s) Documentation as stated above within sixty calendar days of award, or as agreed upon by the Contracting Officer Representative, to receive approval of suggested hardware and software prior to procurement. Upon approval of hardware and software, coordinate with AFCEC to create a draft System Assessment Plan (SAP) in which applicable testing methods will be determined prior to installation.

b. Using the Base Name CECS Inventory Spreadsheet from the Government, annotate with information required by the checklist, as well as the date and name of the Government representative who witnessed validation of each item. Facilitate Government testing of the system via network scans, Security Template Implementation Guide (STIG) testing, Cybersecurity Hygiene Checklist, and provide support for interpreting scan and STIG test results as needed. Demonstrate to the satisfaction of the government all provided system components comply with the Base Name CECS Inventory Spreadsheet, SAP, and Security Controls documentation prior to commissioning.

c. Conduct systems testing and verification, witnessed by the Government and its system operator as each system component is brought online and commissioned. Systems testing and verification must show via operator interface(s) the system statuses and measurements are reported accurately, controls are fully operable, and programming/configuration conforms to statement of work and operator requirements. Notify the contracting officer forthwith of any equipment or system malfunctions encountered before or during testing which are outside the scope of work. Detailed test procedures, results, date/time, witnessing personnel, and other conditions as applicable must be documented for submission as part of close-out submittals.

3.10.1 Security Controls Documentation

Edit existing documentation where applicable; otherwise provide new documentation as described. Provide draft Systems Authorization documents, Access Controls Summary, Auditing Controls Summary, Configuration Management Plan, Contingency Plan, Manufacturer Recommended Security Requirements, Manufacturer Recommended Vulnerability Management Plan, and Manufacturer Recommended Maintenance Plan, as well as Documented Statements along with all formal design submittals, complete with all

information available at the time of the submittal. Provide a document changelog and outline or mark sections of documents which have been changed from originals and from each previous submittal. Provide final Security Controls Documents in conjunction with As-Builts submittals, and additionally, include the completed Base Name 4 Inventory Spreadsheet. Request editable templates for hardware and software lists from the Government, as well as an example network diagram for use as guidance. Hardware and software lists must be in formats editable via Microsoft Excel or .csv file format. Network diagrams for the purpose of RMF submittals must be in formats editable via Microsoft Visio. All documents must be submitted in native (editable) and PDF formats on CD-R or DVD-R in the quantities indicated by the Government.

3.11 TRAINING REQUIREMENTS

- a. If needed/requested, provide on-site training for length of time and personnel as indicated to show how to operate, maintain, troubleshoot, repair, and reconfigure/reprogram the systems. Training requirement must include opportunity for hands-on experience.
- b. Develop and provide an operator manual with step-by-step instructions (with screenshots) demonstrating how to perform key operational and maintenance/troubleshooting tasks.
- c. If any IT component(s) are required in support of the system(s), develop, and provide a systems administration manual for that IT component(s) with step-by-step instructions (with screenshots) demonstrating how to perform key operational and maintenance/troubleshooting tasks (e.g., such as user account maintenance, controlled startup/shutdown procedures, backup/restore procedures, software license maintenance, database maintenance tasks, etc.).
- d. If needed, modify the operator and systems administration manuals based on feedback received at and/or as a result of the training session(s).

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ATTACHMENTS:

Air Force Non-Nuclear Configuration Management Database (CMD) Equipment
Approval List

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SECTION 01 86 26

ELECTRICAL REQUIREMENTS

PART 1 GENERAL

Attachment:

Air Force Non-Nuclear Configuration Management Database (CMD) Equipment Approval List

1.1 REFERENCES

Publications, codes, specifications, and standards shall be used as the basis for the project design and shall include, but not be limited to the following. Publications and codes that imply recommendations shall be taken to be mandatory. Where there are conflicting criteria, the requirements of this RFP take precedence.

The most current edition of the code or standard (with revisions, reprintings, changes, notices, errata, and addenda) available at the RFP proposal submission deadline shall be used as criteria for the design, unless noted otherwise. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

ASTM INTERNATIONAL (ASTM)

ASTM F2160	(2022) Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
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AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP	(2019) Energy Standard for Buildings Except Low-Rise Residential Buildings
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ASHRAE 189.1	(2017) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings
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INTELLIGENCE COMMUNITY STANDARD (ICS)

ICD 705	Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (IC Tech Spec - for ICD/ICS 705, Version 1.5, dated March 2020)
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ICS 705-1	(2010) Physical and Technical Security Standard for Sensitive Compartmented Information Facilities
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ICS 705-2	(2016) Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented
-----------	--

Information Facilities

ICD/ICS 705 (2020) Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2021) International Building Code

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10 (2011; Errata 2015) IES Lighting Handbook

IES LM-79 (2008) Optical and Electrical Measurements of Solid-State Lighting Products

IES LM-80-15 (2015) Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources

TM-21-11 (2011) Projecting Long-Term Luminous, Photon, and Radiant Flux Maintenance of LED Light Sources

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

IEEE 1100 (2005) Emerald Book IEEE Recommended Practice for Powering and Grounding Electronic Equipment

IEEE 1584 (2018) IEEE Guide for Performing Arc-Flash Hazard Calculations

IEEE 386 (2016) Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV

IEEE 399 (1997) Brown Book IEEE Recommended Practice for Power Systems Analysis

IEEE 485 (2020) Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications

IEEE 81 (2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

IEEE C2 (2023) National Electrical Safety Code

IEEE C37.96 (2012) Guide for AC Motor Protection

IEEE C57.12.00 (2021) General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE C57.12.25	(1990) Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34,500 Grdy/19,920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVa and Smaller Requirements
IEEE C57.12.28	(2014) Pad-Mounted Equipment - Enclosure Integrity
IEEE C57.12.70	(2020) Standard Terminal Markings and Connections for Distribution and Power Transformers
IEEE C57.12.80	(2010) Terminology for Power and Distribution Transformers
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2021) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
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NACE INTERNATIONAL (NACE)

NACE SP0169	(2013) Control of External Corrosion on Underground or Submerged Metallic Piping Systems
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2021) Life Safety Code
NFPA 70	(2023) National Electrical Code
NFPA 70B	(2019) Recommended Practice for Electrical Equipment Maintenance
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 72	(2022) National Fire Alarm and Signaling

Code

NFPA 77	(2019) Recommended Practice on Static Electricity
NFPA 110	(2022) Standard for Emergency and Standby Power Systems
NFPA 780	(2023) Standard for the Installation of Lightning Protection Systems

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NECA 90	(2015) Recommended Practice for Commissioning Building Electrical Systems
---------	---

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C136.10	(2017) Roadway and Area Lighting Equipment - Locking - Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
ANSI Z535.1	(2022) Safety Colors
ANSI/NEMA OS 1	(2013, R 2020) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
ANSI/NEMA OS 2	(2013, R 2020) Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA AB 1	(2002) Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
NEMA AB 3	(2013) Molded Case Circuit Breakers and Their Application
ANSI C12.1	(2022) Electric Meters - Code for Electricity Metering
NEMA ANSLG C78.377	(2017) Electric Lamps - Specifications for the Chromaticity of Solid State Lighting Products
NEMA C37.50	(2018) Switchgear - Low-Voltage AC Power Circuit Breakers Used in Enclosures - Test Procedures
NEMA C82.77	(2002) Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment
NEMA FB 1	(2014) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
NEMA ICS 2	(2000; R 2020) Standard for Controllers, Contactors, and Overload Relays Rated 600 V

NEMA ICS 4	(2015) Terminal Blocks
NEMA ICS 5	(2017) Control Circuit and Pilot Devices
NEMA ICS 6	(1993; R 2016) Enclosures
NEMA ICS 7	(2020) Adjustable-Speed Drives
NEMA LA 1	(2009) Surge Arresters
NEMA MG 1	(2021) Motors and Generators
NEMA MG 11	(1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors
NEMA MG 2	(2014) Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators
NEMA MTS	(2019) Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems
NEMA PB 1	(2011) Panelboards
NEMA PB 2	(2011) Deadfront Distribution Switchboards
NEMA RN 1	(2018) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA SSL 1	(2016) Electronic Drivers for LED Devices, Arrays, or Systems
NEMA SSL 3	(2011) High-Power White LED Binning for General Illumination
NEMA ST 20	(2014) Dry-Type Transformers for General Applications
NEMA TC 2	(2020) Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2021) Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA TC 6 & 8	(2020) Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation
NEMA TC 7	(2021) Smooth-Wall Coilable Electrical Polyethylene Conduit
NEMA TC 9	(2020) Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation
NEMA TP 1	(2002) Guide for Determining Energy Efficiency for Distribution Transformers

NEMA TR 1	(2013, R 2019) Transformers, Regulators, and Reactors
NEMA VE 1	(2017) Metal Cable Tray Systems
NEMA VE 2	(2018) Cable Tray Installation Guidelines
NEMA WC 70	(2021) Power Cable Rated 2000 V or Less for the Distribution of Electrical Energy
NEMA WC 71	(2014) Nonshielded Cables Rated 2001-5000V for use in the distribution of electric energy
NEMA WC 74/ICEA S-93-639	(2017) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy
NEMA WD 1	(1999; R 2020) General Color Requirements for Wiring Devices
NEMA WD 6	(2021) Wiring Devices Dimensions Specifications
NEMA WD 7	(2011, R 2016, R 2021) Occupancy Motion Sensors Standard
NEMA Z535.1	(2022) Safety Colors
NEMA Z535.2	(2011, R 2017) Environmental and Facility Safety Signs
NEMA Z535.4	(2011, R 2017) Product Safety Signs and Labels

COMMITTEE ON NATIONAL SECURITY SYSTEMS (CNSS)

CNSSAM	CNSSAM TEMPEST 01-13 (2014) Red-Black Installation Guidance
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TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-607	(2019d) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
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U.S. AIR FORCE (USAF)

GRAND FORKS AFB IFS	(2021) Grand Forks Air Force Base Installation Facilities Standards (IFS)
DAFGM 2022-32-01	(2022) Department of the Air Force Guidance Memorandum, Civil Engineer Control Systems Cybersecurity
AFI 32-1054	(2014) Corrosion Control
AFI 32-1065	(2017) Grounding Systems

AFMAN 32-1062	(2020) Electrical Systems, Power Plants and Generators
AFMAN 32-1065	(2020) Grounding and Electrical Systems
AFMAN 32-1067	(2020) Water and Fuel Systems
AFMAN 32-1084	(2020) Facility Requirements
AFMAN 32-1186	(1999) Valve-Regulated Lead-Acid Batteries for Stationary Applications
AFCEC Standard Design	(Nov 2017) Air Force Standard Design RPA Squadron Operations
AFCEC Standard Design	(Feb 2018) Standard Design Air Force Remotely Piloted Aircraft Squadron Operations Facility

U.S. ARMY CORPS OF ENGINEERS

ODDG	(2019) Omaha District Design Guide
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U.S. DEPARTMENT OF DEFENSE (DOD)

DoDi 6055.17	(2017) DoD Installation Emergency Management (IEM) Program
DoDi 8500.01	(2014) Cybersecurity
MIL-HDBK-232	(1987; Rev A; Notice 1 1988; Notice 2 2000; Notice 3 2014) Red/Black Engineering - Installation Guidelines
MIL-HDBK-419	(1987; Rev A) Grounding, Bonding, and Shielding for Electronic Equipments and Facilities Volumes 1 of 2 Basic Theory
MIL-STD-188-124	(1998; Rev B; Notice 2 1998; Notice 3 2000; Notice 4 2013) Grounding, Bonding and Shielding for Common Long Haul/Tactical Communications Systems, Including Ground Based Communications - Electronics Facilities and Equipments
UFC 1-200-01	(2022) DoD Building Code
UFC 1-200-02	(2020, with Change 2, 2022) High Performance and Sustainable Building Requirements
UFC 3-501-01	(2015, with Change 1, 2019) Electrical Engineering
UFC 3-520-01	(2015, with Change 2, 2021) Interior Electrical Systems
UFC 3-520-05	(2015, with Change 2, 2020) Stationary and Mission Batteries

UFC 3-530-01	(2015, with Change 4, 2019) Design: Interior and Exterior Lighting and Controls
UFC 3-540-01	(2014, with Change 2, 2019) Engine-Driven Generator Systems for Backup Power Applications
UFC 3-550-01	(2016, with Change 3, 2019) Design: Exterior Electrical Power Distribution
UFC 3-560-01	(2017, with Change 2, 2019) Electrical Safety, O&M
UFC 3-570-01	(2016, with Change 1, 2019) Cathodic Protection System
UFC 3-575-01	(2012, with Change 1, 2021) Lightning and Static Electricity Protection Systems
UFC 3-580-01	(2016; with Change 1, 2016) Telecommunications Interior Infrastructure Planning and Design
UFC 3-600-01	(2016; with Change 6, 2021) Fire Protection Engineering for Facilities
UFC 4-010-01	(2018; with Change 2, 2022) DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-05	(2013; with Change 1, 2013) Sensitive Compartmented Information Facilities Planning, Design, and Construction
UFC 4-010-06	(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems
UFC 4-021-01	(2008; with Change 1, 2010) Design and O&M: Mass Notification Systems
UFC 4-021-02	(2013; with Change 1, 2019) Electronic Security Systems
UFC 4-179-02	(2020) Small Arms Ranges

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint January 2020) Standard for Flexible Metal Conduit - Eleventh Edition
UL 1008	(2022) Transfer Switch Equipment - Ninth Edition
UL 1283	(2017; Reprint Jun 2018) UL Standard for Safety Electromagnetic Interference Filters - Seventh Edition
UL 1449	(2021) Surge Protective Devices - Fifth Edition

UL 1472	(2015; Reprint July 2022)) UL Standard for Safety Solid-State Dimming Controls - Second Edition
UL 1581	(2001; Reprint Jun 2021) Electrical Wires, Cables, and Flexible Cords - Fourth Edition
UL 1598	(2021; Reprint June 2021) Luminaires
UL 1598C	(2014; Reprint Jul 2017) Light-Emitting Diode (LED) Retrofit Luminair Conversion Kits - First Edition
UL 1699	(2017; Reprint Feb 2022) Arc-Fault Circuit-Interrupters - Third Edition
UL 20	(2018; Reprint January 2021) General-Use Snap Switches - Fourteenth Edition
UL 2017	(2008; Reprint Dec 2018) General-Purpose Signaling Devices and Systems
UL 231	(2016; Reprint Oct 2022) Power Outlets - Tenth Edition
UL 2556	(2021) UL Standard for Safety Wire and Cable Test Methods - Fifth Edition
UL 294	(2018; Reprint Oct 2018) Access Control System Units - Seventh Edition
UL 44	(2018; Reprint May 2021) Thermoset-Insulated Wires and Cables - Nineteenth Edition
UL 467	(2022) Grounding and Bonding Equipment - Eleventh Edition
UL 486A-486B	(2018; Reprint May 2021) Wire Connectors - Third Edition
UL 486C	(2018; Reprint May 2021) Splicing Wire Connectors - Seventh Edition
UL 486E	(2015; Reprint April 2019) Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors - Fifth Edition
UL 489	(2016; Reprint April 2019) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 497A	(2001; Reprint Oct 2019) Protectors for Paired Conductor Communication Circuits - Third Edition
UL 497B	(2004; Reprint Feb 2022) Protectors for

	Data Communication Circuits and Fire-Alarm Circuits - Fourth Edition
UL 498	(2017; Reprint Jul 2022) Attachment Plugs and Receptacles - Sixteenth Edition
UL 5	(2016; Reprint Jul 2022) Surface Metal Raceways and Fittings - Fifteenth Edition
UL 5085-3	(2006; Reprint Jan 2022) Low Voltage Transformers - Part 3: Class 2 and Class 3 Transformers - First Edition
UL 510	(2020) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape - Tenth Edition
UL 514A	(2013; Reprint Jun 2022) Metallic Outlet Boxes - Eleventh Edition
UL 514B	(2012; Reprint May 2022) Conduit, Tubing and Cable Fittings - Sixth Edition
UL 514C	(2014; Reprint Feb 2020) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers - Fourth Edition
UL 5A	(2015; Reprint Aug 2020) Nonmetallic Surface Raceways and Fittings - Fourth Edition
UL 6	(2022) Electrical Rigid Metal Conduit-Steel - Fourteenth Edition
UL 634	(2007; Reprint Mar 2015) Connectors and Switches for Use with Burglar-Alarm Systems - Ninth Edition
UL 639	(2007; Reprint Nov 2019) Standard for Intrusion Detection Units - Eighth Edition
UL 681	(2014; Reprint Jan 2021) Installation and Classification of Burglar and Holdup Alarm Systems - Fifteenth Edition
UL 651	(2011; Reprint May 2022) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings - Eighth Edition
UL 651A	(2011; Reprint Mar 2017) Type EB and A Rigid PVC Conduit and HDPE Conduit - Fifth Edition
UL 67	(2018; Reprint Jul 2020) Standard for Panelboards - Thirteenth Edition
UL 773	(2016; Reprint Jul 2020) Standard for Plug-In, Locking Type Photocontrols for Use with Area Lighting - Fifth Edition

UL 83	(2017; Reprint Apr 2020) Thermoplastic-Insulated Wires and Cables - Sixteenth Edition
UL 845	(2021) UL Standard for Safety Motor Control Centers - Sixth Edition
UL 854	(2020) Standard for Service-Entrance Cables - Twelfth Edition
UL 857	(2009; Reprint Apr 2021) UL Standard for Safety Busways - Thirteenth Edition
UL 864	(2014; Reprint May 2020) UL Standard for Safety Control Units and Accessories for Fire Alarm Systems - Tenth Edition
UL 8750	(2015; Reprint Sept 2021) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products - Second Edition
UL 891	(2019) Switchboards - Twelfth Edition
UL 924	(2016; Reprint May 2020) Standard for Emergency Lighting and Power Equipment - Tenth Edition
UL 943	(2016; Reprint Feb 2018) Ground-Fault Circuit-Interrupters - Fifth Edition
UL 94	(2013; Reprint Apr 2022) UL Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances - Sixth Edition
UL 96	(2016; Reprint Mar 2020) Standard for Lightning Protection Components - Sixth Edition
UL 969	(2017; Reprint Mar 2018) Standard for Marking and Labeling Systems - Fifth Edition
UL 60335-2-34	(2017) Household and Similar Appliances, Part 2: Particular Requirements for Motor-Compressors - Sixth Edition

1.2 SCOPE OF WORK

This project will include all design, calculations, etc., for all systems required for Building 631 and associated facilities described herein at Grand Forks Air Force Base, North Dakota. See Specification Section 01 81 00 for a description of the facility, functional requirements, and overall scope of work under this contract.

Select electrical characteristics of the power system to provide a safe,

efficient, and economical distribution of power, based upon the size and types of loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served.

The effect of nonlinear loads such as computers and other electronic devices shall be considered and accommodated as necessary. These loads generate harmonics, which can overload conventionally sized conductors or equipment and thereby cause safety hazards and premature failures. Circuits shall be equipped with a separate neutral conductor not shared with other circuits. Panelboards and any dry-type transformers shall be rated accordingly.

All associated references listed in paragraph 1.1 REFERENCES are required to be included in the design and construction of the building.

A survey of existing conditions, including location of underground utilities, shall be conducted, the conditions documented, and incorporated prior to submitting the 100% design.

The Designer shall edit the applicable UFGS specifications sections and submit them as a part of the design submittal specification.

All equipment shall be rated for an elevation of 913 feet above sea level or derated for such elevation. Coordination between Contractor and Nodak Electrical Cooperative will be required. Nodak will own, provide, and maintain all primary electrical service and distribution transformers.

In addition to this specification, refer to the Room Data Sheets for requirements specific to individual spaces and space types.

Contractor shall repair any cuts made to existing road, sidewalk, and parking lot surfaces that are to remain in place after construction. Repair shall match existing road, sidewalk, and parking lot cross section, respectively.

1.2.1 Primary Power Utility Feed

This portion of work includes installation of new underground 15kV medium voltage electrical distribution systems. All work shall meet the requirements of this Subpart.

All exterior power distribution is owned and maintained by Nodak Electrical Cooperative. The demarcation point for Nodak and Grand Forks AFB property is the secondary lugs on the transformer serving Building 631.

The existing service transformer is 750KVA 480V/277V and is located near the southwest corner of the building. The existing service transformer and medium voltage feeder appear to have been installed around 1998 and do not have enough capacity. Additional capacity is needed to support the SIM Data Center Requirements being implemented in this design. The estimated load with room for future growth is 1500KVA. Also, a larger 10MW medium voltage feeder is needed to support Building 631 and buildings that will be added in the near future.

The Contractor shall negotiate a cost and contract with Nodak to provide the 10MW feeder and larger service transformer with a minimum size of 1500KVA. Nodak has provided a cost estimate of \$900K to provide a new feeder capable of 10MW from the Steen Substation to Building 631 and a new

1500KVA transformer.

Nodak shall perform demolition and replacement of the existing service transformer. Nodak shall furnish and install a 1500KVA or larger service transformer as part of this contract. Nodak shall also furnish and install a new medium voltage feeder capable of 10MW from the Steen Substation to Building 631 as part of this contract.

1.2.2 Building Electric Service

The existing main switchboard (MSB) is rated 800A 480V/277V and is located outside near the southwest corner of the building. The switchboard appears to have been installed around 1998 but will need to be replaced to provide the additional capacity required for this facility. The Contractor shall demolish the existing equipment and provide a new service entrance rated switchboard MSB with integral SPD and ground fault protection. The new MSB shall feed the new electrical distribution. If the new MSB is located outside, it shall have lockable doors to prevent access from unauthorized personnel.

All existing electrical equipment, conduit, and wiring in each electrical/mechanical room shall be demolished and replaced.

All distribution equipment, feeders, branch circuits, and wiring shall be replaced.

All existing exposed conduit shall be replaced with new. Existing concealed conduit shall remain in place for reuse where possible. Where existing concealed conduit cannot be reused, new recessed conduit shall be provided.

New receptacles shall be recessed. Surface mounted receptacles and conduit are not acceptable.

The various load types will be segregated for metering purposes to achieve ASHRAE 90.1 and 189.1 submetering requirements (where applicable), and will be reported through the Grand Forks AFB emergency management control system (EMCS). ASHRAE 90.1 will be used per 10 CFR 433 and UFC 1-200-02. Per ASHRAE 90.1, the following must be metered separately: total electrical energy, HVAC systems, interior lighting, exterior lighting, receptacle circuits. Up to 10% of the load for each category (other than total electrical energy) are allowed to be from other electrical loads. Per UFC 1-200-02 section 2-3.3, provide meters as required by DoDI 4170.11, and as amended by DoD Utilities Meter Policy. Provide separate metering for telecommunications systems and fire alarm systems.

The main circuit breaker for the building MSB will be rated for the full load of the transformer. Size the Main Service Entrance in accordance with NFPA 70 and UFC calculations and coordinate with Nodak Electrical Cooperative for the Main Service Overcurrent Protective Device settings. POC for Nodak Electrical Cooperative is Steve Breidenbach Phone: 701-741-3969 or 701-795-6759 Email: sbreidenbach@nodakelectric.com

1.2.3 Cybersecurity

Provide cybersecurity in accordance with specification 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS for all systems that meet the definition of an industrial control system (ICS), SCADA, or facility related control system (FRCS).

1.2.4 Uninterruptible Power Systems (UPS)

Three independent uninterruptable power supply (UPS) systems shall be provided for this building. Each of the three independent UPS systems shall have two modules (A and B) each rated for 30 minutes at a minimum of 200kW at 0.8 power factor and be capable of carrying the entire load in the event one of the UPS modules fails (shall provide 2N redundancy). Each of the three independent UPS systems shall be physically located in SIM Server Room 1, SIM Server Room 2, and the Communication Server Room. Each UPS system shall provide power for the loads in the areas listed in the Room Data Sheets in the appendices. The Communication Server Room UPS system shall also provide power for all industrial control systems (HVAC controls and electrical controls) throughout the building. Each UPS module and system shall be provided with a by-pass cabinet to allow work on individual unit(s) or entire system, but still maintain power to the critical load. The UPS systems shall be provided with a temperature controlled environment. Input is 480Y/277V three-phase with a 208Y/120V three-phase output. Each UPS module A and B shall be a minimum size of 200KW at 0.8 power factor. Each UPS module A and B shall provide power to a separate electrical distributions or set of power panels (A and B). Each UPS system shall provide 30 minutes of battery discharge time to end voltage at 77 degrees F. UPS batteries for each UPS module shall be capable of delivering 125 percent of full rated UPS KW load at 0.8 power factor at initial start-up and shall be sized in accordance with IEEE Standard 485. UPS batteries shall be lead calcium that is of the float-type, absorbed glass mat (AGM) valve-regulated, lead-acid, sealed, non-gassing, recombinant type (VRLA) rated for 10 years. Batteries shall be factory assembled in separate matching cabinets, complete with battery disconnect switches. The UPS battery storage area shall meet the requirements of UFC 3-520-05, and any other applicable references listed in Section 1.1 REFERENCES. See Room Data Sheets in the appendices for specific rooms requiring UPS power.

1.2.5 Standby Generator

The building shall be equipped with a standby diesel generator and automatic transfer switch (ATS) rated to provide adequate power for the entire building and the communication hut. Grand Forks Air Force Base maintenance personnel are most familiar with Cummins generators and therefore the generator shall be manufactured by Cummins. The generator system shall comply with the applicable portions of UFC 3-540-01 and have the following features and parameters:

- a. At a minimum, shall be capable of providing 1200kW at 0.8 power factor. Shall be sized for a continuous output of 1200kW at 0.8 power factor. As part of the design, the contractor shall determine if additional generator capacity is required and provide a larger generator if needed.
- b. Certified for EPA Tier 2 emission requirements.
- c. Overload Capacity: 110 percent of Service Load for 1 hour in 12 consecutive hours
- d. Voltage regulation (no load to full load) stand-alone: plus or minus 2 percent (maximum)
- e. Voltage Bandwidth (steady state): plus or minus 0.5 percent.
- f. Frequency: 60 Hz
- g. Voltage: 480 volts
- h. Phases: 3 Phase, Wye
- i. Max Step Load Increase: 50 percent of Service Load at 0.8 power factor

- j. Transient Recovery Time with Step Load Increase (Voltage): 3 seconds
- k. Transient Recovery: 3 seconds
- l. Maximum Voltage Deviation with Step Load Increase: 10 percent of rated voltage
- m. Maximum Frequency Deviation with Step Load Increase: 2.5 percent of rated frequency
- n. Maximum Summer Outdoor Temperature: 120 degrees F
- o. Minimum Winter Outdoor Temperature: -50 degrees F
- p. Installation Elevation: 1000 Feet above sea level
- q. Designated as emergency use and limited to 100 hours of runtime per year.
- r. Equipped with 72 hours of onsite fuel storage with a fuel polishing system. This meets UFC 3-540-01 and Grand Forks AFB requirements. Contractor shall provide cathodic protection for any buried metallic fuel lines.
- s. Equipped with an attached load bank capable of fully loading the generator. Load bank shall be capable of being adjusted in 100KW steps from 100KW up to 1200KW.
- t. All batteries shall be sealed lead acid.
- u. Designed to utilize #2-D diesel fuel.
- v. Equipped with block or coolant heater for the Grand Forks AFB climate.
- w. Equipped with a heated generator enclosure with 3'-4' of clearance space around the generator inside to perform maintenance during the cold winters.
- x. Concrete walkway around the generator for maintenance.
- y. Concrete driveway for a truck to drive up to the generator for maintenance.
- z. Site lighting for night time generator maintenance.

1.2.6 SIM Lab Area

In the SIM Lab area, the contractor shall provide IT equipment racks, hot aisle containment system, and in row coolers. Power panels shall be on the exterior walls in SIM area. Power shall be provided over head and cooling shall be under the raised floor. Provide 42U racks and an 18" raised floor. Area is to be flexible, so that everything could be gutted and reconfigured if needed in the future.

1.2.7 New Communications Building (Communication Hut)

Provide power from Building 631 to the new communication hut. Power source shall be backed up by generator. Provide a dedicated power panel in the communication hut building. The power panel shall provide all power necessary for the communication hut including but not limited to communication racks, redundant HVAC, lighting, fire alarm system, and general purpose receptacles.

1.2.8 Blue Beacon Light System

Provide a blue beacon light system to indicate when uncleared personnel are in the building. Provide blue beacon rotating light fixtures in every corridor and hallway on both the first and second floor. Provide a switch to turn the blue beacon light system on or off at the main entrance in Corridor-1. Perform lighting design with lighting calculations to demonstrate the light will be visible in every corridor and hallway on the first and second floor. Blue beacon rotating light fixtures shall have the following features: minimum two LED bulbs, rotating, and 120VAC.

1.2.9 Appendix H and Appendix I

Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B provide additional design requirements from the customer including requirements for specific Room Data Sheets in Appendix A. The design shall meet the requirements of Appendix H and Appendix I. In the event of a conflict, the requirements of this specification, the drawings, and Room Data Sheets shall supersede Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B.

Where Appendix H and Appendix I require "Emergency Lighting" for a space. The Contractor shall assume all light fixtures in this area require emergency lighting.

1.3 Submittals

SD-06 Test Reports

Cable Installation Plan and Procedure; G, DO

Six copies of the information described below in 8-1/2 by 11 inch binders, having a minimum of three rings from which material may readily be removed and replaced, including a separate section for each cable pull. Separate sections by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull. PDF files are also acceptable.

- a. Site layout drawing with cable pulls numerically identified.
- b. List of equipment used, with calibration certifications.
- c. Manufacturer and quantity of lubricant used on pull.
- d. Cable manufacturer and type of cable.
- e. Dates of cable pulls, time of day, and ambient temperature.
- f. Length of cable pull and calculated cable pulling tensions.
- g. Actual cable pulling tensions encountered during pull.

1.4 Certificate of Competency for Cable Installer, and Splicer/Terminator

The cable splicer/terminator must have a certification from the National Cable Splicing Certification Board (NCSCB) in the field of splicing and terminating shielded medium voltage (5 kV to 35 kV) power cable using pre-manufactured kits (pre-molded, heat-shrink, cold shrink). Submit "Proof of Certification" for approval, for the individuals that will be performing cable splicer and termination work, 30 days before splices or terminations are to be made.

Provide at least one on-site person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling operations. Provide a resume showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers. Cable

installer must demonstrate experience with a minimum of three medium voltage cable installations. The Contracting Officer reserves the right to require additional proof of competency or to reject the individual and call for an alternate qualified cable installer.

PART 2 PRODUCTS AND INSTALLATION

2.1 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with contract requirements will be accepted. Products shall meet all requirements and standards listed in Section 1.1 REFERENCES.

2.2 Special Environmental Conditions

Exterior electrical equipment, such as motors and lights, shall be suitable for the environment and shall operate within a temperature range of -50 degree F to 100 degrees F.

2.3 Accommodation of Disabilities

Designs shall incorporate provisions of ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). All aspects concerning placement and sizing from these standards shall be incorporated. Provisions pertaining to clearances shall generally be accommodated by other disciplines, however, the design shall observe some precautions such as avoiding equipment configurations which would project into restricted clear space in corridors.

2.4 Antiterrorism/Force Protection

The designs shall comply with UFC 4-010-01.

2.4.1 Unobstructed Space

Ensure that obstructions within 33-feet of inhabited buildings or portions thereof do not allow for concealment from observation of objects 6-inches or greater in height.

2.4.2 Electrical and Mechanical Equipment

The preferred location of electrical and mechanical equipment, such as transformers, air-cooled condensers, and packaged chillers, is outside the unobstructed space, or inside the buildings.

2.4.3 Utility Distribution and Installation

Route critical utilities and those necessary for life-safety so that they are not on exterior walls or on walls shared with mailrooms. Provide physical separation between normal and alternate power sources for n + 1 reliability, such that no single event will impact both sources.

2.5 Coordination of Electrical Criteria

Electrical criteria provided in this section shall be coordinated with the architectural section, mechanical section, communications section, fire protection section, structural section, interior design section, civil and site section, force protection and security section, and all other sections of this RFP. The number and location of electrical equipment indicated in the electrical requirements are approximate. Contractor designs shall meet the intent of the electrical requirements provided in this section. Contractor shall coordinate the final locations of electrical equipment with the Contracting Officer.

2.6 Exterior Primary Electrical Distribution System

For exterior primary electrical distribution contact Nodak Electrical Cooperative. POC is Steve Breidenbach Phone: 701-741-3969 or 701-795-6759 Email: sbreidenbach@nodakelectric.com. Provide Nodak with anticipated load. Nodak will size transformers and will provide locations for service transformers as well as all necessary switches. Contractor shall provide all equipment pads. Nodak will design and install all exterior primary electrical service.

2.7 Products and Installation

2.7.1 Cable Marking

Identify each cable by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag must contain the following information: cable type, conductor size, circuit number, circuit voltage, cable destination, and phase identification.

Conductors must be color-coded. Provide conductor identification within each enclosure where a tap, splice, or termination is made. Conductor identification must be by color-coded insulated conductors; plastic-coated, self-sticking, printed markers; colored nylon cable ties and plates; heat-shrink type sleeves; or colored electrical tape. Control circuit terminations must be properly identified. Color must be green for grounding conductors and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, other neutrals must be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems must be as follows:

- a. 208/120 volt, three-phase
 - (1) Phase A - black
 - (2) Phase B - red
 - (3) Phase C - blue
- b. 120/240 volt, single phase: Black and red
- c. 480/277 volt, three phase
 - (1) Phase A - brown
 - (2) Phase B - orange (wye and delta systems)
 - (3) Phase C - yellow
 - (4) Neutral - grey

2.7.2 Conduits

Conduits shall be smoothwall, approved/listed for directional boring, minimum Schedule 80, ASTM F2160, and NEMA TC 7. All non-metallic utility lines shall have #12 AWG TW (thermal-weather resistant) coated conductor installed parallel with and 6 inches above the utility for the reception of a locator transmitter signal.

2.7.2.1 Non-Encased Duct

Conduits shall be non-encased, direct buried for low voltage circuits. Non-concrete-encased conduits shall be schedule 80 PVC or HDPE until they are located under slab where they can transition to schedule 40 PVC or HDPE. Top of conduit shall be the following minimum depths below finished grade:

Low Voltage Service Entrance: 36 inches.
Branch Circuits/Equipment Feeders: 24 inches.
Lighting Circuits: 24 inches.

Adjust routing to provide minimum 1'-6" separation when crossing existing and new underground utilities while maintaining minimum depths below finished grade listed above.

Conduits and innerduct shall have pull strings. Transition to RGS conduit when above grade. Elbows in transitions shall be RGS.

2.7.3 Innerduct

Provide corrugated or solid-wall polyethylene (PE), or PVC innerducts, or fabric-mesh innerducts, with pullwire.

2.7.4 Duct Sealant

UL 94, Class HBF. Provide high-expansion urethane foam duct sealant that expands and hardens to form a closed, chemically and water resistant, rigid structure. Sealant must be compatible with common cable and wire jackets, and capable of adhering to metals, plastics and concrete. Sealant must be capable of curing in temperature ranges of 35 degrees F to 95 degrees F. Cured sealant must withstand temperature ranges of -50 degrees F to 200 degrees F without loss of function.

2.7.5 Fittings

All conduit fittings shall meet the following, applicable standards and the applicable standards or requirements listed in paragraph 1.1 References.

2.7.5.1 Metal Fittings

All metal fittings shall be per UL 514B.

2.7.5.2 PVC Conduit Fittings

All PVC conduit fittings shall be per UL 514B and UL 651.

2.7.5.3 PVC Duct Fittings

All PVC duct fittings shall be per NEMA TC 9.

2.7.6 Terminations and Splices

Termination kits shall be type 3M. No splices shall be allowed in the manholes; instead, an above-ground, medium voltage, pad-mounted sectionalizer switch shall be located at the required manhole location, with a termination strip and screw type elbows in the manhole, fully insulated. The mounting hardware shall be grounded to the ground conductor. Each type elbow shall have its own drain conductor grounded to the ground conductor.

2.7.7 Separable Insulated Connector Type

IEEE 386. Provide connector with steel reinforced hook-stick eye, grounding eye, test point, and arc-quenching contact material. Provide connectors of the loadbreak or deadbreak type as indicated, of suitable construction for the application and the type of cable connected, and that include cable shield adaptors. Provide external clamping points and test points. Separable connectors must not be used in manholes/handholes.

2.8 Pad-Mounted Tamperproof Compartmental Transformer

The pad-mounted transformer shall have copper windings and conductors, have mineral oil insulation of low flammability type, or "non-flammable", or "less flammable liquid-filled" with no PCB contaminates. The transformer shall be loop feed type with load-break switching and surge arresters on spare bushings. Transformer pad shall extend 10-inches beyond the edge of the transformer furnished. Transformer pad shall use conduit window areas instead of pouring around the conduit. Provide at least one spare 4-inch primary conduit to the transformer. Pad-mounted transformer shall comply with IEEE C57.12.25.

2.8.1 Locations

Transformers locations should comply with UFC 4-010-01.

2.8.2 Clearances

Exterior equipment shall be mounted such that the distance between equipment items is no less than 10-feet and such that the personal egress space around the equipment is no less than 42 inches.

2.8.3 Grounding

- a. Frame of the transformer is to be grounded from the high voltage equipment pad and the low voltage equipment pad.
- b. On the grounded-wye secondary, a ground strap is required from XO to the frame.
- c. When a building has a lightning protection system with a ground ring and the transformer has a ground ring and the ground rings are within 25-feet of each other, then the ground rings shall be interconnected below grade.
- d. Service from transformer to buildings shall not have a grounding conductor. Service from Transformers to buildings shall have a full-size neutral conductor no smaller than the phase conductors.

f. Provide a ground ring (counterpoise); minimum size shall be #4/0 AWG, around pad with a ground rod at each corner. The ground ring size shall be increased in size to the proper size per IEEE C2, if the fault current indicates that #4/0 AWG is not adequate.

g. Extend separate conductors from arresters and transformer neutral/housing and connect to the ground ring.

h. Ground any metallic conduit/duct to the ground ring.

i. Provide any other connections required by the NEC or NESC.

2.8.4 Over-Current Protection

Provide type Bay-O-Net dual-element fuse mounted in series with an ELSP current-limiting fuse.

2.8.5 Design for Precast Structures

In the absence of detailed on-site soil information, design for the following soil parameters/site conditions:

- a. Angle of Internal Friction (ϕ) = 30 degrees
- b. Unit Weight of Soil (Dry) = 110 pcf, (Saturated) = 130 pcf
- c. Coefficient of Lateral Earth Pressure (K_a) = 0.33
- d. Ground Water Level = 2.5 feet below ground elevation
- e. Horizontal design loads must include full geostatic and hydrostatic pressures for the soil parameters, water table, and depth of installation to be encountered. Also, horizontal loads imposed by adjacent structure foundations, and horizontal load components of vertical design loads, including impact, must be considered, along with a pulling-in iron design load of 6000 pounds.
- f. Each structural component must be designed for the load combination and positioning resulting in the maximum shear and moment for that particular component.
- g. Design must also consider the live loads induced in the handling, installation, and backfilling of the manholes. Provide lifting devices to ensure structural integrity during handling and installation.

2.9 CABLE PLAN & PROCEDURES

2.9.1 Cable Installation Plan And Procedure

Obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature limits for installation, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, maximum allowable pulling tension, and maximum allowable sidewall bearing pressure. Perform pulling calculations and prepare a pulling plan and submit along with the manufacturer's instructions in accordance with SUBMITTALS. Install cable

strictly in accordance with the cable manufacturer's recommendations and the approved installation plan.

Calculations and pulling plan must include:

- a. Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.
- b. List of cable installation equipment.
- c. Lubricant manufacturer's application instructions.
- d. Procedure for resealing cable ends to prevent moisture from entering cable.
- e. Cable pulling tension calculations of all cable pulls.
- f. Cable percentage conduit fill.
- g. Cable sidewall bearing pressure.
- h. Cable minimum bend radius and minimum diameter of pulling wheels used.
- i. Cable jam ratio.
- j. Maximum allowable pulling tension on each different type and size of conductor.
- k. Maximum allowable pulling tension on pulling device.

2.10 Underground Service Entrance/Feeder/Branch Circuits

The new underground service entrance shall be fed from the new transformer provided by Nodak.

2.11 Conductors

Service entrance conductors, branch and feeder circuits shall be single conductors, type USE or RHW. Underground feeder/branch circuits shall be copper conductors with insulating grounding conductor in conduit. Aluminum conductors and direct buried cables are NOT acceptable.

2.12 Exterior Lighting System

The existing exterior lighting system shall be replaced. New area lighting shall be provided for walkways, above exit doors, above overhead doors, and for area signage. Lighting fixtures shall be LED full-cutoff type. Fixture finish shall be bronze. Light poles shall be round tapered steel with bronze finish. Mirada Medium - MRM Outdoor LED Area Light fixture shall be used as the basis of design. The use of LED bollards is also acceptable for walkway lighting, but shall only be installed near building entryways. Designs shall be in accordance with IES HB-10 IES LIGHTING HANDBOOK, ASHRAE 90.1 - IP, UFC 3-530-01 and the requirements in this section. Where there is a conflict between IES HB-10 IES LIGHTING HANDBOOK and UFC 3-530-01, IES HB-10 shall take precedent.

Care should be taken during the exterior lighting design to minimize the amount of light trespass. This may be accomplished through a variety of methods including but not limited to full cut off fixtures, light fixture

shields, and fixture aiming. The exterior lighting system design shall result in a maximum illuminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 10-feet beyond the site boundary. Site lighting fixtures shall be selected so that no more than 2% of the total lumen output for the site are emitted at an angle of 90-degrees or higher from nadir.

All exterior pole mounted lights will be 277V.

2.13 Exterior Building Lighting

All existing exterior lighting shall be replaced. Exterior building lighting fixtures shall be recessed and wall pack type fixtures installed around the buildings and over doors. Fixtures shall be LED and sized to meet the lighting criteria. Fixtures shall be mounted near each entrance and exit for the buildings. The existing exterior building lighting controls shall be replaced as part of this project. Exterior building lighting control shall be as referenced in paragraph "Exterior Lighting Control" below. Fixtures shall be wired from within the buildings and shall conform to the interior wiring standards described in this section.

2.13.1 LED Lighting Fixtures

Light emitting diode (LED) fixtures shall be capable of multi-level control with a CCT of 3985 K +/-275K and a CRI of no less than 70. LED fixtures with screw base light sources are not permitted. Built in fixture failure detection shall be provided. Exterior LED luminaires require integral metal oxide varistors (MOV) type surge protection device (SPD).

LED drivers shall have a total current harmonic distortion no greater than 20 percent, power factor greater than or equal to 90 percent.

2.13.2 Exterior Lighting Controls

Provide programmable lighting control relay panel with photocell input. Building mounted lights shall be individually controlled as per lighting type. Exterior fixtures shall make use of motion sensors to automatically reduce power by a minimum of 30% during any period when no activity has been detected for a time of no longer than 15 minutes.

2.13.3 Underground Lighting Circuits

Provide underground branch circuits for exterior lighting circuits. Branch circuits shall be insulated copper conductors with insulated grounding conductor in conduit. Aluminum conductors are NOT acceptable. Direct buried conductors are NOT acceptable. Underground lighting conductors shall be in schedule 80 PVC with steel RMC elbows. Transition to steel RMC conduit when above grade. Top of conduit shall be 24-inches below finished grade.

2.14 Cathodic Protection System

A sacrificial anode cathodic protection system shall be provided for underground metallic lines, fittings, valves and fire hydrants. If underground lines are non-metallic, then associated metallic fittings, valves, hydrants, Tees and 90's, etc. shall be protected and there shall be a tracer wire provided over the pipeline. A dedicated galvanic anode shall be used for each fitting, valve, hydrant, etc. Galvanic anodes

shall be connected to the structure through a test station. At least one test station shall be provided on each valve, fire hydrant and metallic pipe. Isolate new piping from existing piping. Insulated flanges or couplings, if not accessible, shall have a test station which is connected to either side of the insulated flange or coupling. Connections to structures shall be done with two conductors: one is the active conductor and one is a spare. A conductor color coding system shall be used: black for anode, red for main structure and blue for a second structure. In addition to the anodes, metallic pipes must be provided with a coating system. The cathodic protection systems shall be designed and installed in accordance with AFI 32-1054 and NACE SP0169 Standards. The design of the system shall be a minimum of 25 years with a soil resistivity of 1500 ohm-cm. The highest quality magnesium anode shall be used. Criteria for determining the adequacy of protection shall be in accordance with NACE SP0169 and shall be selected by the corrosion engineer as applicable. Test stations shall be flush-curb box mounted in 1-foot X 1-foot concrete pads. Anode wires shall be #10 AWG.

Design shall be by a corrosion protection engineer.

2.15 Underground Cable Markings

A color-coded plastic warning tape at least 4-inches wide shall be placed 12-inches above buried utility lines. RED shall be supplied for the buried electrical lines and ORANGE shall be supplied for the buried communication lines.

2.16 Interior Distribution

Follow the design requirements of UFC 3-520-01 and ODDG.

The interior distribution voltage within the building shall be 480/277 volt, 3-phase, 4-wire. Power shall be stepped down from 480/277 volts to 120/208 volts for branch power. Transformers that serve non-linear loads such as the computer receptacles shall be K-rated. Provide K-4 rated transformers if the connected load is less than or equal to 50 percent non-linear and K-13 if the load is greater than 50 percent non-linear. Transformers shall be selected using 2016 DOE efficiency standards. Provide transformers per Air Force TM 5-811-1/AFJMAN 32-1080 Chapter 8 and TSEWG TP-5.

Large HVAC equipment will be powered using 3-phase, 480 volts. Lighting will be powered using 277 volts. Inside the building, power shall be stepped down from 480/277 volts to 120/208 volts for branch power.

2.17 Service Equipment

Service equipment/disconnecting means shall be provided in the service rated Main Distribution Panelboards (MDP) located in the Electric Rooms. Transient Voltage Surge Suppression (TVSS) suitable for service distribution equipment shall be provided at the MDP in a separate compartment or external in accordance with UFC 3-520-01. Provide automatic transfer switch and generator connection in accordance with UFC 3-540-01 to serve the entire building load.

2.17.1 Main Distribution Panelboard (MDP)

Provide panelboards in accordance with the following:

- a. UL 67 and UL 50 having a short-circuit current rating of 10,000 amperes

symmetrical minimum.

- b. Panelboards for use as service disconnecting means: additionally conform to UL 869A.
- c. Panelboards: circuit breaker-equipped.

Lighting and appliance branch-circuit panelboards shall be of the circuit breaker type conforming to NEMA PB 1 and UL 489 and shall be located within the electrical rooms.

- a. Panelboard shall not exceed 78-inches in height from the finished floor.
- b. Panelboards shall have a minimum of 15 percent spare capacity for future loads at the end of the project. Panelboards shall have a minimum of 15 percent spare circuit breakers. Spare circuit breakers shall be redundant of the type of circuit breaker being provided in the panelboard.
- c. Panelboard busses shall be tin-plated copper only. Aluminum busses are not acceptable.
- d. The phase loading on panelboards shall be balanced as much as practical by the type of loads on the panel. This includes equally disbursing the spares between the phases.
- e. Panelboards shall be provided with an "As-Built" panel schedule which is typed and placed in a protective holder located on the front inside of the panelboard door.
- f. Panels shall have hinged covers door-in-door construction with master keyed flush tumbler latches.
- g. All circuit breakers shall be bolt-on type breakers only. Stab-in breakers shall not be allowed.
- h. Thermal-magnetic breakers larger than 150 amps shall have adjustable, instantaneous magnetic trip.

2.18 KWHR Meter

The kilowatt-hour meters shall be stand alone meters. KWHR meters with 15-minute demand registers shall be provided for recording energy consumption of the facility and shall also record maximum demand and power factor for each phase. Meters shall be provided with factory-installed electronic pulse initiators meeting ANSI C12.1 for connection to the BASE AMRS - (Advanced Meter Reading System).

The various load types will be segregated for metering purposes to achieve ASHRAE 90.1 and 189.1 submetering requirements (where applicable), and will be reported through the Grand Forks AFB AMRS. ASHRAE 90.1-2013 will be used per 10 CFR 433 and UFC 1-200-02. Per ASHRAE 90.1-2013, the following must be metered separately: total electrical energy, HVAC systems, interior lighting, exterior lighting, and receptacle circuits. Up to 10% of the load for each category (other than total electrical energy) are allowed to be from other electrical loads

2.19 Power System Analysis

2.19.1 Short-Circuit Study

A full short-circuit analysis shall be performed on the electrical

distribution systems for the buildings. The studies shall include the interior electrical distribution systems and service distribution systems back to the new primary line from the Steen Substation. Follow ASHRAE 90.1 - IP which keeps feeders (2%) and branch circuits (3%) separate for voltage-drop calculations.

2.19.2 Protective Coordination Study

A full protective coordination study shall be performed on the electrical distribution systems for the buildings, with recommended changes to the relays in the Protective Circuit Breakers. The studies shall include the interior electrical distribution systems and service distribution systems back to the new primary line from the Steen Substation.

2.19.3 Arc-Flash Hazard Study

A full arc-flash hazard study shall be performed in accordance with NFPA 70E and IEEE 1584 on the electrical distribution systems for the buildings with recommendations for Personnel Protective Equipment (PPE) at the equipment. Provide warning/danger labels and signs at the equipment. The studies shall include the interior electrical distribution systems and service distribution systems back to the new primary line from the Steen Substation.

2.20 Security Requirements

2.20.1 Security Systems

The following items shall be used as a checklist or guide for the Security System in addition to the publication and documents referenced above:

- a. Contractors shall be a certified value added resellers/installers of the electronic security system to be installed, provide all hardware, software, programming manuals, installation manuals, device installation/data sheets, factory training, and training manuals for new security alarm control panels. Factory training shall include sufficient training to be able to program (add/or change devices) and make PC connections to backup system data files.
- b. Installation As-Built drawings shall be created in hard copy and digital form.
- c. Security panels' programmed data files shall be copied to storage disks placed in the panel.
- d. Security Systems shall be run in conduit (EMT/RIGID) raceway, and all Security Control Panels and junction boxes shall be tamper-proof. Each zone wiring shall have a different color combination other than red and black, unless manufacture requires a jacketed, twisted pair with a shield, and if used, will be identified at each termination as to what zone it is. The field devices power wiring shall be red for positive DC voltage and black for negative voltage.
- e. The Electronic Security System shall consist of all conduits, interior and exterior, run between ESS compononets along with pull strings. It shall also include the Electronic Security System communications equipment rack, to be located in the Secure Communication Closet Room 133.

2.20.2 CCTV

The purchase and installation of cameras, cables, video recording equipment, etc, shall be part of this contract.

A Closed-Circuit TV system that is stand-alone shall be provided. The stand-alone system will have the camera's signal run to recording equipment stored locally in the Security Office Room 124. The CCTV system shall provide a minimum additional capacity for 10 cameras to be added later

The CCTV system shall be provided with a lockable cabinet. The CCTV system shall be provided with dedicated infrastructure not shared with other networks. Contract shall include everything necessary for a fully functional CCTV system.

All cameras shall be day/night, minimum 2MP, color/black and white, with IR.

Each CCTV camera location shall be provided with separate, dedicated home-run conduits. The CCTV camera power and signal shall be carried over Power over Ethernet (PoE) infrastructure on minimum CAT6 cabling.

NVR shall have minimum 30 day 100% recording capacity.

CCTV shall be provided for the following spaces: The entry control point or main entrance which is Corridor-1 on the floorplan drawings. Provide up to 2 additional camera locations of the customer's choosing during the design.

2.20.3 Keyless Access Control System(s) (ACS)

Procurement and installation of the ACS equipment package shall be part of this contract.

ACS shall be provided in rooms according to the Room Data Sheets and concept plans.

The software and system should be of the same manufacturer of the IDS system selected during design. See paragraph 2.21.3 below for more information. Provide a system administrator computer station in Security Office Room 124. Card Readers shall use two authentications (card and PIN). Card readers shall be included on the GSA FIPS 201 Approved Product List. Coordinate with the COR for specific system requirements. The COR will provide Grand Forks AFB's card reader keyless access entry control system specifications, which will include voltage and data line specifications. The system shall be as designed and installed in accordance with AFI 31-101 IC2, ESE-SIT-0001, and ESE-TP-0023.

Contract shall include everything necessary for a fully functional ACS system including but not limited to full design, infrastructure, equipment, and installation of low voltage and communication lines. Infrastructure shall include junction boxes, conduit, pull wires, and mortise locks with integrated REX wired back to a junction box. Communication lines will be terminated at the ESS server within the Secure Communication Closet. An itemized equipment list shall be provided for the access control system.

2.20.4 Intrusion Detection System(s) (IDS)

Procurement and installation of the IDS equipment package shall be part of this contract.

The software and system currently used at Grand Forks AFB is Advantor. Grand forks AFB is looking to use Vindicator if possible. The new system shall be compatible with Advantor. Provide a system administrator computer station in Security Office. The entire building is one security zone. IDS shall be provided for all areas along the perimeter of the building. Contract shall include everything necessary for a fully functional IDS system including but not limited to full design, infrastructure, equipment, wiring, conduit, junction boxes and shall be designed to meet provisions of ICD 705, ICS 705-1, and IC Tech Spec for ICD/ICS 705.

IDS systems shall be provided with minimum 24-hour battery backup or UPS system.

IDS signals shall be connected via conduit and telecom cables to the Secure Communication Closet Room 133, and from there, connected through the telecommunications service entrance in Room 120, and from there, connected via existing and new underground ducts to the new Communication Hut building, and from there, connected via new and existing underground ducts to Building 339 to the existing Grand Forks AFB Security Forces IDS server.

2.21 Motors

Motors shall be of sufficient size for the duty to be performed and shall not exceed the full-loading rating when the driven equipment is operating at specified capacity under the most severe conditions encountered.

a. Motors shall have open frames and continuous-duty classification and be based on a 40 degree C ambient temperature reference.

b. Permanently wired polyphase motors of 1 horsepower or more, shall meet the minimum full-load efficiencies in NEMA MG 1 for NEMA Premium™ Efficiency Electric Motors, except that 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.

c. Power factor correction capacitors are to be installed with individual motors 25 HP and larger, as a minimum, unless the motor is controlled by a variable frequency drive (VFD). In the case of a VFD, capacitors are not required.

d. Motor starters shall use circuit breakers instead of fuses.

e. Thermal overloads shall be the bimetallic type that can be reset. The magnetic overload option shall only be used if indicated by the manufacturer of the equipment.

f. Reduced voltage starters shall be used on motors which are 50 HP or larger as a minimum.

g. Three-phase motors shall have phase-loss protection.

h. Disconnect switches for motors shall be heavy duty type. Exterior

switches shall be rain-tight with in NEMA 4 enclosures. Disconnect switches for packaged HVAC equipment shall be as required by the equipment manufacturer.

i. Motors controlled by variable frequency drives shall have Class H wiring insulation and be rated for inverter duty.

2.22 General Purpose Duplex Receptacle Outlets

Duplex receptacle outlets for general purpose applications shall be NEMA WD 6 Type 5-20R, 20 amp, 125 volt, 2-pole, 3-wire grounding type. A maximum of five duplex general purpose receptacles may be connected to a 20A, 120V receptacle circuit. Receptacle circuits shall not supply lighting and motor loads. General purpose duplex receptacle outlets shall be located in the facility as follows:

- a. Provide general-use duplex receptacles a minimum of 10-feet on-center in offices and a minimum of every 25-feet along the walls in all other areas of the buildings except as otherwise indicated. For small rooms that do not have 10-foot walls, a minimum of one outlet shall be installed on each wall. Receptacles shall be mounted 18-inches above finished floor or above counters where counters are installed.
- b. Provide general-use duplex receptacles a minimum of 50-feet on center in corridors with a minimum of one per corridor. Receptacles shall be mounted 18-inches above finished floor.
- c. Provide one GFCI general-use duplex receptacles in each janitor's closet.
- d. Provide general-use duplex receptacles adjacent to each each cable jack.
- e. Provide two general-use duplex receptacles adjacent to each telecommunications outlet within administrative spaces.
- f. Provide a general purpose duplex receptacle outlet adjacent to sink in the restrooms. Receptacle outlets shall have (GFCI) ground fault circuit interrupters. Mount receptacle outlets 48-inches above finished floor.
- g. This paragraph shall apply to all Room Data Sheets included in the Appendicies. The exact location of receptacle outlets shall be verified and coordinated during the design of the project. Coordinate the location of the receptacle outlets with the Interior Design package (furniture layout). Power and communication to system furniture in open office spaces shall be served by connections to system furniture whenever possible. Feed system furniture from ceiling boxes. Power poles are acceptable. Provide 8-wire, 4-circuit configuration to system furniture with #10 AWG neutral. Make final connections to the system furniture receptacle outlets. The furniture for each desk shall have at least two double-duplex receptacle outlets or eight NEMA 5-20 receptacle outlets. If power poles are not possible or do not make sense in some areas, wall mounted receptacle outlets are acceptable in those areas. Power and telecom connections shall be provided via wall-mounted power and telecom receptacle outlets in conference rooms except where the room dimensions require floor receptacle outlets per NFPA 70. If wall mounted receptacle outlets are used for computer workstations, conference rooms, or briefing rooms, provide two double-duplex (quadplex) receptacle outlets for each computer workstation and one double-duplex (quadplex) receptable outlet for each printer adjacent to communication outlets. Provide dedicated

circuit for each printer, copy machine, or break area appliance. Computer workstation receptacle outlets shall be double-duplex, 20 amp, 120 volt, 2-pole, 3-wire grounding type receptacles as per UFC 3-580-01. A maximum of four duplex computer receptacles shall be connected to a receptacle circuit. Mount the receptacle outlets 18-inches above finished floor. Maintain a separation of 6-inches from the telephone/data outlets. Exact location of all computer receptacle outlets shall be verified and coordinated with the furniture layout during the design of the project; locations in private and shared offices shall permit future furniture location flexibility (i.e. account for such data and power outlets on opposing walls in private offices such that cables need not be routed across walking paths). One computer receptacle outlet shall be provided adjacent to every voice/data outlet. Provide capability for future alternate configurations.

h. Provide general-use duplex receptacles at break room countertops. A minimum of two branch circuits shall be used to supply receptacles installed at the break room countertop. Receptacles installed at break room countertops shall be spaced such that no point along the wall line is more than 24 inches, measured horizontally, from a receptacle.

2.22.1 Special Receptacles

Ground Fault Circuit Interrupter (GFCI) receptacle outlets shall be provided in restrooms, at sink countertops in restrooms and break rooms, in janitor's closets, at other wet locations, and for vending machines. Weatherproof GFCI receptacles for exterior use, shall be weatherproof, whether or not plug is inserted, and have a polycarbonate cover plate. Exact location of the receptacles noted below shall be coordinated during the design of this project. Except where indicated otherwise, provide NEMA 5-20R, 20 amp, 125 volt, 2-pole, 3-wire grounding type, duplex receptacles in the following locations:

a. Provide either a duplex ground fault circuit interrupter receptacle, or a ground fault circuit interrupter breaker for each electric water cooler.

b. Provide duplex receptacle outlet for government-furnished and government-installed copiers, printers, scanners, shredders, and fax machines in locations as shown on the interior furniture plans. Provide a dedicated circuit for each copier, printer, and shredder.

c. Provide a weatherproof duplex receptacle with ground fault circuit interrupter on the exterior of the buildings, adjacent to each personnel exit door of the building. Mount receptacles 24-inches above finished grade. Provide additional receptacles around the exterior of the facility located for convenient access but at no more than 165-feet on-center with a minimum of one per side.

g. Provide outlets where required by the NFPA 70 for servicing HVAC equipment.

h. Provide occupancy controlled receptacles in the office spaces per ASHRAE 90.1.

2.23 Device Plates

Communication outlets, switches, receptacles, etc. shall be gray. Device plates shall be brushed stainless steel in areas with finished walls. In areas with unfinished walls, like mechanical walls, the device plate shall

also be brushed stainless steel.

2.24 Other Loads

Designer of Record shall coordinate with the other applicable sections. The anticipated loading and power configuration for some items will be provided, but the Designer of Record is still responsible for the final coordination with the actual equipment installed. Contractor shall provide electrical power to the following loads, either by receptacle or direct wired as applicable. This list is representative and is not considered to be all-inclusive: Microwaves, Refrigerators, Water Coolers, Mechanical Equipment, Electrical Equipment, Communications Equipment, and Fire Alarm Equipment.

2.25 Architectural and Mechanical Connections

Contractor shall provide branch circuits, disconnect switches, magnetic starters, and other related electrical equipment and material for architectural, mechanical, and environmental equipment to be installed in the project. This includes the facility and site. This shall include hand dryers, HVAC units, chillers, humidifiers, unit heaters, pumps, exhaust fans, heat tracing, and other mechanical equipment in the facility.

2.26 Wiring Methods

Wiring shall conform to NFPA 70, UFC 3-520-01, and the requirements of this section.

2.26.1 Conductors

Conductors shall be copper. Minimum power wiring shall consist of #12 AWG conductors installed in 3/4-inch conduits. Power and lighting conductors shall be 600 volt, Type THHN (in dry locations), and THWN-2 or XHHW (in wet locations). Cabling systems such as mineral-insulated cables, metallic-armored cables, and nonmetallic-sheathed cables shall not be allowed on this project.

Conductors shall be sized based upon the 75°C column of NEC Table 310-15(B)(16) for loads above 100A and 60°C column of NEC Table 310-15(B)(16) for loads 100A and smaller. All wiring shall meet UL 2556, UL 44, UL 486A-486B, UL 486C, UL 83, & UL 854.

2.26.2 Conduits

Wiring shall consist of insulated conductors installed in steel rigid metallic conduit (RMC), electrical metallic tubing (EMT), or intermediate metal conduit (IMC). Conduit size shall be based on use of single conductor cable with THW or RHW insulation for sizes #1 AWG and smaller. Flexible metal conduit (FMC) is permitted only where equipment vibration is a consideration. Plastic conduit is allowed only underground or under the floor slab. Raceways shall be concealed within finished walls, ceilings, and floors. Conduit that is exposed along walls in areas that are subject to damage shall be RMC. All raceways shall meet UL 1, UL 5, UL 514B, UL 5A, UL 6, UL 651, & UL 651A.

2.27 Interior Lighting System

All existing lighting shall be replaced. Provide according to the requirements in UFC 3-530-01 and ASHRAE 90.1. If the designer chooses to

use a networked lighting system of any kind, a Certification and Accreditation shall be obtained, refer to Cybersecurity specification 01 35 13 for additional information. Products shall meet UL 1472, UL 1581, UL 20, UL 20, & UL 924.

2.27.1 Illumination Levels

Average maintained illumination levels shall not be less than the values listed in UFC 4-179-02. The illumination levels identified shall be maintained design intensity, including light loss factors. A light loss factor (LLF) of 0.7 shall be used when calculating lighting levels.

2.27.2 Conservation Requirements

Contractor shall optimize buildings performance by the use of occupancy sensors and the use of sensors to control loads based on the availability of natural light. Illumination levels, in conjunction with energy conservation, shall be obtained by the most life cycle cost-effective techniques including, but not limited to, the following:

a. Provide multiple switching of multi-lamp fixtures or multiple switching of fixture groups in large rooms, or both, to permit lighting fixtures to be turned off in unoccupied areas.

b. Provide LED fixture and drivers with a minimum of 85 percent efficiency, less than or equal to 20 percent THD, and with power factor correction to exceed 90 percent.

c. Occupancy and daylight sensors shall be used where recommended in UFC 3-530-01.

d. Location of light switches shall be coordinated with the floor plan and furniture layout to ensure that they are easily accessible and convenient.

2.27.3 Incandescent Lighting Fixtures

Incandescent lighting fixtures shall NOT be used.

2.27.4 LED Lighting Fixtures

Light emitting diode (LED) fixtures shall be dimmable or capable of multi-level control with a CCT of 3500 K (unless otherwise indicated) and a CRI of no less than 80. LED fixtures with screw base light sources are not permitted. Built in fixture failure detection shall be provided.

LED drivers shall have a total current harmonic distortion no greater than 20 percent at full and 50 percent output and power factor greater than or equal to 90 percent at full and 50 percent output. Dimmable or bi-level drivers shall be compatible with standard dimmer control circuit or 0-10V. LED Fixtures shall meet UFC 3-530-01, & IES LM-79

2.27.5 Egress and Exit Lighting Fixtures

Egress and exit lighting design shall be in accordance with NFPA 101, and ICC IBC. Exit lights shall be red LED type with brushed aluminum faces for exit doors and green LED type with brushed aluminum faces for egress routes. Incandescent exit lighting fixtures are not permitted. Egress and exit light fixtures shall have individual battery back up. Egress lighting fixtures shall be provided from room LED light fixtures throughout the

facility. Emergency egress lighting shall be provided for common areas such as lobbies, corridors, restrooms and in utilitarian rooms such as mechanical rooms, and electrical rooms, communications rooms, etc, with one of the egress light fixtures the fixture closest to the exit doorway.

2.28 Energy Management Control System (EMCS)

Provide power as required for EMCS or DDC components (such as dampers, VAV boxes, control panels, etc.) requiring power.

2.29 Lightning Protection System

Provide a complete and functional lightning protection system (LPS) for each building in accordance with latest edition of NFPA 70, NFPA 780, UL 96, and UFC 3-575-01. Systems shall be UL Master Labeled. In addition to the ground rods, 4 ground test wells (one at each corner of each building) shall be provided for test purposes. Conductors shall be copper, except that aluminum or bronze may be used for connection to mechanical aluminum housings. Connections below grade, to main conductor and down conductors, shall be by exothermic weld process. Alternate bonding methods will be allowed to metal bodies (vent hoods, exhaust stacks) which have light enough weight to make exothermic welds impractical. Down conductors shall be concealed in PVC conduit and not visible from the exterior. The lightning protection systems shall be concealed systems.

2.30 Grounding System

The basis of all of the grounding for this project is initiated via an Earth Electrode System (EES) around the perimeter of each facility. All metallic objects that pass under, or that are close (within 6-feet) to the EES shall be bonded to the EES. The Lightning Protection System (LPS) shall be connected to the EES via multiple down conductors. The EES shall be bonded to the duct bank and to the ground ring around the facility transformer. The EES shall be extended into the main electrical room to the MDS. The EES shall also be extended into the telecommunications entrance room, where it shall be connected to the telecommunications main grounding busbar (TMGB)

The grounding system shall be designed in accordance with NFPA 70 Article 250, IEEE 1100, AFI 32-1065, and the following criteria. Ground rods shall be ¾-inch x 10-foot copper clad steel.

Lightning protection component penetrations and attachments shall be sealed and flashed and anchored in a permanent manner and in a manner to avoid the degradation of the watertight integrity of the roof system. Do not cut or otherwise disturb the roof membrane. Verify with the membrane manufacturer that any products used near the roofing membrane will not cause damages or delamination. Mastic seals in the plane of the roof are unacceptable. Anchor plates set in mastic shall be set on roof surface cleaned of aggregate and loose material prior to mastic application.

2.30.1 Communications Grounding System

See COMMUNICATION REQUIREMENTS 01 86 29.

Provide corrosion-resistant grounding busbar suitable for indoor installation in accordance with TIA-607. Busbars: plated for reduced contact resistance. If not plated, clean the busbar prior to fastening the conductors to the busbar and apply an anti-oxidant to the contact area

to control corrosion and reduce contact resistance. Provide a telecommunications main grounding busbar (TMGB) in the telecommunications entrance facility. The telecommunications main grounding busbar (TMGB), sized in accordance with the immediate application requirements and with consideration of future growth. Provide telecommunications grounding busbars with the following:

- a. Predrilled, copper busbar provided with holes for use with standard sized lugs,
- b. Minimum dimensions of 0.25 in thick by 6 in wide for the TMGB with 36 in length.
- c. Listed by a nationally recognized testing laboratory.

2.30.2 Ground Bus

Copper ground bus: provided in the electrical equipment rooms with minimum dimensions of 0.25 in thick by 6 in wide by 24 in.

2.30.3 Equipment Grounding Conductors

A green equipment grounding conductor, sized in accordance with NFPA 70 shall be provided, regardless of the type of conduit. Equipment grounding bars shall be provided in panelboards. The equipment grounding conductors shall be carried back to the service entrance grounding connection or separately derived grounding connection. Equipment grounding conductors shall be provided in feeders and branch circuits.

2.30.4 Earth Electrode System

The maximum resistance measured of the earth electrode system shall not exceed 5 ohms under normally dry conditions. Ground rods shall be ¾-inch x 10-foot copper clad ground rods.

2.30.5 Separately Derived System

For dry-type transformers within buildings, the grounding electrode conductor shall be connected to adjacent structural steel or to a common grounding electrode conductor per NFPA 70. If there are multiple dry-type transformers within a room, a copper ground bar shall be used as the connection point. This bar shall be bonded to the grounding electrode or common grounding electrode conductor. The grounding bars and the conductors shall be sized to handle the combined fault duty of the equipment connected. Use exothermic welds for the connection.

2.31 Equipment Sizing Requirements and Ratings

Except as specifically noted otherwise, minimum required capacity of the equipment bus shall be computed from the estimated maximum demand (EMD) for the panelboard, switchboard, motor control center and be specified as having the next larger manufactured standard bus or main lug size.

Overcurrent protection for panelboards, switchboards, switchgear and motor control centers with heavy motor loads, sizing must also consider starting current of the largest motor or motors in addition to the continuous demand amperes.

2.31.1 Interrupting Capacities

Equipment ratings shall be determined based on results of the short-circuit analysis. Minimum standard interrupting ratings shall be identified on the plans, preferably on a one-line diagram, or alternately in panel schedules. Ratings may be called out in the specifications when single items are involved. The designer shall identify variables (such as equipment impedances) which could affect available short-circuit current and verify that equipment acceptable under contract plans and specifications would not permit fault current levels higher than the specified interrupting ratings.

2.31.2 Feeders and Branch Circuits

Branch circuit sizes shall be based on the load supplied, number of current-carrying conductors, ambient temperature, and voltage drop requirements. Feeders to distribution equipment such as panelboards, motor control centers, and switchboards shall be sized to allow the full capacity of the panelboards, motor control centers, and switchboards bus bar ampere rating to be used, adjusted for ampacity adjustments, corrections and voltage drop requirements. Voltage drop shall be taken into account when sizing branch circuits. Feeder conductors shall be sized for a maximum voltage drop of 2 percent at circuit's rated capacity. Branch circuit conductors shall be sized for a maximum voltage drop of 3 percent at the circuit's rated capacity. See UFC 3-501-01 for voltage drop requirements.

2.31.3 Transformer Feeders

Sizes for primary and secondary feeders for transformers shall be based on the service entrance equipment frame size. This criteria also applies to the service entrance conductors. Feeder ampacity shall not be less than the rating of the overcurrent device at the termination of the secondary conductors.

2.31.4 Neutral Sizing

Use of full-size neutrals shall be standard practice. For applications involving harmonics-generating equipment (inverter, variable frequency drives, other solid state apparatus), the neutral must be treated as a current carrying conductor. Multi-wire branch circuits with common neutrals shall not be permitted to serve data processing applications, including personal computers, but branch circuits shall have an individual neutral for each phase conductor. All branch circuit phase conductors shall be provided with a dedicated neutral.

2.31.5 Derating

Ampacity of conductors is to be derated per NFPA 70 Article 310, if more than three current-carrying conductors are installed in a raceway. Four-wire feeders, where the neutral is considered a current-carrying conductor, shall have an additional 20 percent derating. A maximum of nine current-carrying conductors, using NFPA 70 designated derating factors, shall be installed in any raceway. When nonlinear loads are served, the neutral must be treated as a phase conductor. If a double-size neutral is employed, count it as two line conductors.

2.31.6 Nuisance Tripping

For a period of one year after construction, the contractor shall be responsible for correcting problems which may arise from nuisance tripping. Nuisance tripping shall be defined as having breakers or fuses activating under an overload condition while the equipment was operating within manufacturer parameters. These situations shall be corrected by making changes to the installation at no cost to the Government. These corrections can increase the trip setting or fuse size, as long as the increased setting is still at, or below, setting maximums given in NFPA 70. Any change could impact other items not listed, such as conductor sizing and upstream coordination settings.

Any changes made to correct nuisance tripping shall be incorporated into the protective coordination and arc-flash hazard studies and updated arc-flash labels shall be provided for equipment as necessary at no additional cost to the government.

2.32 Installation

The Contractor shall install system components, switchboards, panels, lighting, equipment connections, etc., including Government-furnished equipment, and appurtenances in accordance with the manufacturer's instructions and shall furnish necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system. Interior wiring, including low voltage wiring, shall be installed in steel conduit. Minimum conduit shall be 1/2-inch. Flexible cords or cord connections shall not be used to supply power to any components, except where specifically allowed in writing by the Contracting Officer. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. The installation wiring shall use terminal strips, wire nuts, or crimp terminals. Devices shall use terminal points, strips or screw terminals for the wiring connections points - pigtail connections are not acceptable. If the manufacturer needs to use special cable, e.g. twisted and shielded, then the minimum wire size and insulation voltage rating shall be met.

PART 3 FIELD QUALITY CONTROL

3.1 Testing

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer five working days notice prior to each test.

As a minimum, test equipment according to the applicable commissioning procedures in NECA 90, in addition to the requirements of Section 01 91 00.15. Document the test results and take corrective actions, as necessary, based on these results.

3.2 Devices Subject to Manual Operation

Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

3.3 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short-circuits or

accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter, using an instrument which applies voltage of approximately 500 volts, to provide a direct reading of resistance. Minimum resistance: 250,000 ohms.

3.4 Transformer Tests

Perform the standard, not optional, tests in accordance with the Inspection and Test Procedures for transformers: dry type, air-cooled, 600 volt and below, as specified in NETA ATS. Measure primary and secondary voltages for proper tap settings. Tests need not be performed by a recognized independent testing firm or independent electrical consulting firm.

3.5 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed.

3.6 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

3.7 Watthour Meter

a. Visual and mechanical inspection

- (1) Examine for broken parts, shipping damage, and tightness of connections.
- (2) Verify that meter type, scales, and connections are in accordance with approved shop drawings.

b. Electrical tests

- (1) Determine accuracy of meter.
- (2) Calibrate watthour meters to one-half percent.
- (3) Verify that correct multiplier has been placed on face of meter, where applicable.

-- End of Section --

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SECTION 01 86 29

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SECTION 01 86 29

COMMUNICATIONS REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

Publications, codes, specifications, and standards shall be used as the basis for the project design. Publications and codes that imply recommendations shall be taken to be mandatory. Where there are conflicting criteria, the requirements of this RFP take precedence. References shall include, but not be limited, to the following.

The most current edition of the code or standard (with revisions, reprintings, changes, notices, errata, and addenda) available at the RFP proposal submission deadline shall be used as criteria for the design, unless noted otherwise. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

38 ES/ENCE

38 ES/ENCE EMNS

Emergency Mass Notification System ESS

U.S. AIR FORCE (USAF)

AF 91-501

Air Force Consolidated Occupational Safety Standard

AFGM 2017-32-01

Air Force Guidance Memorandum, Civil Engineer Control Systems Cybersecurity

AFI 10-2501

Air Force Emergency Management Program Planning and Operations

AFI 33-210

Certification and Accreditation (C&A) Program

AFI 64-101

Cable Television on Air Force Bases

AFI 32-1065

(2017) Grounding Systems

AFMAN 32-1084

(2020) Facility Requirements

TSFPEWG G 3-600-01.01-18

Air Force Fire Protection Engineering Criteria and Technical Guidance for Mission Continuity of Electronic, Information Technology, and Telecommunications Equipment Installations

MILITARY

MIL-HDBK-419A Grounding, Bonding, and Shielding for
Electronic Equipments and Facilities

AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL (ASTM)

ASTM B1 (2018) Standard Specification for
Hard-Drawn Copper Wire

ASTM B8 (2011; R 2017) Standard Specification for
Concentric-Lay-Stranded Copper Conductors,
Hard, Medium-Hard, or Soft

ASTM C857 (2019) Standard Practice for Minimum
Structural Design Loading for Underground
Precast Concrete Utility Structures

ASTM F512 (2017) Smooth-Wall Poly (Vinyl Chloride)
(PVC) Conduit and Fittings for Underground
Installation

ASTM F2160 (2022) Standard Specification for Solid
Wall High Density Polyethylene (HDPE)
Conduit Based on Controlled Outside
Diameter (OD)

ARMY CORPS OF ENGINEERS (COE)

EM 385-1-1 (2014) Safety and Health Requirements
Manual

BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL (BICSI)

TDMM Telecommunications Distribution Methods
Manual, 13th Edition

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS 1755 Telecommunications Standards and
Specifications for Materials, Equipment
and Construction

RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)

RUS Bull 1753F-201 (1997) Acceptance Tests of
Telecommunications Plant (PC-4)

U.S. DEPARTMENT OF DEFENSE (DOD)

DODI 8500.01 (2019) Cybersecurity

DODI 8510.01 (2022) Risk Management Framework (RMF) for
DoD Information Technology (IT)

UFC 3-575-01 (2012; with Change 1, 2021) Lightning and
Static Electricity Protection Systems

UFC 3-580-01	(2016; Change 1 2016) Telecommunications Interior Infrastructure Planning and Design
UFC 3-600-01	(2016; with Change 6, 2021) Design: Fire Protection Engineering for Facilities Design: Fire Protection Engineering for Facilities
UFC 4-010-05	(2013; with Change 1, 2013) Sensitive Compartmented Information Facilities Planning, Design, and Construction
UFC 4-010-06	(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems
UFC 4-021-01	(2008; with Change 1, 2010) Design and O&M: Mass Notification Systems
UFC 4-021-02	(2013; with Change 1, 2019) Electronic Security Systems

INTELLIGENCE COMMUNITY STANDARD (ICS)

ICS 705-1	(2010) Physical and Technical Security Standard for Sensitive Compartmented Information Facilities
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INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-83-596	(2021) Indoor Optical Fiber Cables
ICEA S-87-640	(2016) Optical Fiber Outside Plant Communications Cable; 6th Edition

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2023) National Electrical Safety Code
IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines
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UNDERWRITERS LABORATORIES (UL)

UL 5	Surface Metal Raceways and Fittings
UL 5A	Nonmetallic Surface Raceways and Fittings
UL 5C	Standard for Surface Raceways and Fittings

	for Use with Data, Signal, and Control Circuits
UL 83	Thermoplastic-Insulated Wires and Cables
UL 444	Communications Cables
UL 467	(2022) Grounding and Bonding Equipment - Eleventh Edition
UL 497	Protectors for Paired-Conductor Communication Circuits
UL 497B	(2004; Reprint Feb 2022) Standard for Protectors for Data Communications and Fire-Alarm Circuits - Fourth Edition
UL 510	(2020) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013; Reprint Jun 2022) Metallic Outlet Boxes - Eleventh Edition
UL 514B	(2012; Reprint May 2022) Conduit, Tubing and Cable Fittings - Sixth Edition
UL 514C	(2014; Reprint Feb 2020) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers - Fourth Edition
UL 514D	Cover Plates for Flush-Mounted Wiring Devices
UL 651	(2011; Reprint May 2022) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings - Eighth Edition
UL 797	Electric Metallic Tubing - Steel
UL 969	(2017; Reprint Mar 2018) Standard for Marking and Labeling Systems - Fifth Edition
UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
UL 2239	Hardware for the Support of Conduit, Tubing, and Cable

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-455	(2014c) General requirements for standard test procedures for optical fibers, cables, transducers, sensors, connecting and terminating devices, and other fiber optic components
TIA-455-78	(2020c) FOTP-78 Optical Fibres - Part

	1-40: Measurement Methods and Test Procedures - Attenuation
TIA-455-78-B	(2020c) FOTP-78 Optical Fibres - Part 1-40: Measurement Methods and Test Procedures - Attenuation
TIA-455-107	(1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set
TIA-472D000	(2007b) Sectional Specification (Adopted ANSI/ICEA S-87-640-2006) Standard for Optical Fiber Outside Plant Communications Cable
TIA-492AAAA	(2009b) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers
TIA-492AAAB	(2009a) 50-Um Core Diameter/125-Um Cladding Diameter Class IA Graded-Index Multimode Optical Fibers
TIA-492CAAA	(2002) Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers
TIA-492E000	(1996; R 2002) Sectional Specification for Class IVd Nonzero-Dispersion Single-Mode Optical Fibers for the 1550 nm Window
TIA-526-7	(2015a; R 2022) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
TIA-526-14	(2015c) Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; Modification of IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant-Multimode Attenuation Measurement
TIA-568.0	(2020e) Generic Telecommunications Cabling for Customer Premises
TIA-568.1	(2020e) Commercial Building Telecommunications Infrastructure Standard
TIA-568.2	(2018d) Balanced Twisted-Pair Telecommunications Cabling and Components
TIA-568.3	(2016d) Optical Fiber Cabling and Components Standard
TIA-569	(2019e) Telecommunications Pathways and Spaces
TIA-590	(1997a) Standard for Physical Location and

Protection of Below Ground Fiber Optic
Cable Plant

TIA-604-10	(2008) FOCIS 10B Fiber Optic Connector Intermateability Standard- Type LC
TIA-606	(2021d) Administration Standard for Telecommunications Infrastructure
TIA-607	(2019d) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard
TIA-942	(2017b) Telecommunications Infrastructure Standard for Data Centers
TIA-1152	(2016; R 2021) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
TIA/EIA-598	(2014D; Add 2 2018) Optical Fiber Cable Color Coding

ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION (ECIA)

ECIA EIA/ECA 310-E	(2005) Cabinets, Racks, Panels, and Associated Equipment
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NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C62.61	(1993) American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits
NEMA WC 63.1	(2005) Performance Standard for Twisted Pair Premise Voice and Data Communications Cable
NEMA TC 6 & 8	(2020) Standard for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installations
NEMA WC 66	(2019) Standard for Category 6 and 6A, 100 Ohm, Individually Unshielded Twisted Pairs, Indoor Cables (With or Without an Overall Shield) for Use in LAN Communication Wiring Systems
NEMA VE 1	(2017) Metal Cable Tray Systems
NEMA VE 2	(2018) Cable Tray Installation Guidelines

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70

(2023) National Electrical Code

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA CFR 29 Part 1910.268

Telecommunications

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA-568.2, TIA-568.3, TIA-606, and IEEE 100 and herein.

1.3 Coordination of Communications Criteria

All communications criteria provided in this section shall be coordinated with all other sections of the RFP. The locations of all equipment indicated in the communications requirements are approximate. Contractor shall coordinate the final number/locations of all equipment with the Contracting Officer. Contractor shall meet the requirements of the Americans with Disabilities Act (ADA) 36 CFR 1191.

1.4 Designer and Installer Requirements

All voice and data communications design shall be performed by a BICSI Registered Communications Distribution Designer (RCDD). The communications media (Telephone cables, LAN cables, and fiber optic cables) shall be installed by BICSI certified technicians and installers. The structured cabling system shall be certified by the manufacturer with the longest warranty available.

The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation, and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system, or any of its components shall be BICSI Registered Cabling Installers. Submit documentation of current BICSI certification for each of the key personnel.

1.5 Scope and Standards

See Section 01 81 00 for a description of the facility and overall scope of work.

Building telecommunications cabling systems (BCS) and outside plant (OSP) telecommunications-cabling system shall conform to applicable criteria. This project will include all design, calculations, etc., for all systems required. All associated references are required to be included in this design and construction of the renovated buildings.

A survey of existing conditions, including location of underground utilities, shall be provided and incorporated prior to submitting the 100% design.

If the UFGS products or systems are applicable to the project, the DOR shall edit these referenced UFGS sections and submit them as a part of the design submittal specification.

Design and construction shall follow all applicable Department of Defense, U.S. Air Force and industry codes and standards set forth in Subpart 1.1 "References".

In addition to this specification, refer to the Room Data Sheets in Appendix A and Facility ICD Annexes A and B located in Appendix H and Appendix I for requirements specific to individual spaces and space types.

All equipment shall be rated for an elevation of 975 feet above sea level or derated for such elevation.

Contractor shall repair any cuts made to existing road, sidewalk, and parking lot surfaces that are to remain in place after construction. Repair shall match existing road, sidewalk, and parking lot cross section, respectively.

Except as explicitly indicated, wireless and plug-and-play controls shall not be used.

1.5.1 Appendix H and Appendix I

Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B provide additional design requirements from the customer including requirements for specific Room Data Sheets in Appendix A. The design shall meet the requirements of Appendix H and Appendix I. In the event of a conflict, the requirements of this specification, the drawings, and Room Data Sheets shall supersede Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B.

1.6 Cybersecurity

Provide cybersecurity in accordance with specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS for all systems that meet the definition of an industrial control system (ICS), SCADA, or facility related control system (FRCS).

1.7 INTERIOR BLDG. REQUIREMENTS

1.7.1 Demolition

Remove all existing interior telecommunications cabling, jacks, and gangboxes.

1.7.2 Interior Communications Cabling Systems

All voice and data communications design shall be performed by a BICSI Registered Communications Distribution Designer (RCDD). The communications media (Telephone cables, LAN cables, and fiber optic cables) shall be installed by BICSI certified technicians and installers. The structured cabling system shall be certified by the manufacturer with the longest warranty available. All work shall be at a minimum in accordance with UFC 3-580-01 and applicable industry codes and standards as listed in Subpart 1.1 "References".

The design shall form a complete voice and data communications system, including, but not limited to: wires, terminations, raceway, cable tray,

cabinets/racks, outlets, etc., to support both secure and unsecure workstation voice and data outlets.

Workstation outlets shall be located at each workstation, printer, and podium/lecturn location as indicated on drawings.

All wiring shall be tested; sample testing shall not be permitted. Design and installation shall be provided by BICSI (Building Industry Consulting Services International) certified personnel. Proof of certification must be provided. The installed structured cable system shall be certified by the manufacturer and installer to perform at TIA standards for Category 6 and OM4 MM Fiber for a period of not less than 15 years. The contractor shall provide the required warranty to support the system certification.

All interior communication wiring systems shall have the cabling labeled with a unique alphanumeric number at beginning and end termination points of the cable. The alphanumeric number shall also be placed by the jack on the device plate.

A record of all communication wiring installed by this contract shall be provided in a Windows based cable management software along with a hard copy of the printout. A licensed copy of the cable management software shall be provided. Labeling shall be done per TIA-606.

1.7.3 Security Classifications and Requirements

All backbone, riser, and horizontal cable is subject to red/black separation and physical and technical security requirements as applicable per UFC 4-010-05, ICS 705-1, and the IC Tech Spec-for ICD/ICS 705 unless otherwise noted.

Cabling, patch panels, connector blocks, work area outlets, and cable connectors must be color coded to distinguish their classification level. If color coding is not possible, cabling must be clearly marked to indicate their classification level.

All classified cabling/jacks shall terminate in secured Telecommunications room.

1.7.4 Cable TV (CATV)

Wiring for CATV shall be provided for the Heritage Room. It shall only include rough-ins with outlets, plates, and cabling back to the communication room.

Space shall be made available within the telecommunications rooms for the future installation of equipment by satellite providers.

1.7.5 Cable Types

This facility shall be pre-wired for voice, and data communication systems.

Horizontal cabling shall be Category-6 unshielded twisted pair (UTP) copper cable for unclassified voice and NIPR data and OM4 or better Multimode fiber optic cable for classified voice and SIPR data. All interior telecommunications cables shall be Plenum rated.

Each workstation within Secured Work Area (SWA) spaces shall consist of 12 strands of OM4 MM Fiber terminated to dual LC connectors and 4 CAT6 UTP

ethernet cables terminated to RJ45 connectors at a minimum. All workstations in unclassified spaces shall have 4 CAT 6 ethernet cables. All cables shall be new and meet or exceed the fire prevention requirements of NFPA 70, NFPA 75, and NFPA 780 as applicable to telecommunication wire and cable. All cables shall have a minimum of 25 feet of slack.

1.7.6 Emergency Systems

Copper cables for emergency or life-safety phone lines shall be 24 AWG, 4 pair, TIA-568.2 Category-6, unshielded, twisted pair (UTP), plenum-rated, solid copper station cable. All cables, including patch cords, shall be tested meeting TIA-1152, for Category 6 performance. Extrapolation from a lower frequency is not allowed. The installation acceptance test shall be a "channel test" and includes all patch connections and cables. Testing shall be accomplished with a Cat 6, Level III compliant tester. One cable shall be dedicated to one jack. Daisy chaining is not be permitted.

1.7.7 Audio-Visual System (A/V)

Full design and infrastructure provisions for the installation of low voltage and communication lines shall be provided as part of the base bid package. The A/V systems shall be complete and functional assemblages of equipment required to achieve the specified functionality, performance, and design intent. The A/V systems will utilize the latest equipment and capabilities that are determined to best meet the functional requirements. This includes but is not limited to:

- a. Audio equipment: Speakers (Speakers are required for Mass Briefing room and Heritage room. Briefing rooms A and B as well as Confernece room do not require speakers), mixers, amplifiers, microphones, signal processing equipment, and source equipment.
- b. Video equipment: Displays, signal routing and processing equipment, and source equipment.
- c. Video projection screens and monitors.
- d. Remote control equipment including touch panels, control processors, software, and programming.
- e. Equipment racks and associated hardware such as rack screws, power distribution products, cooling products, and blank panels.
- f. Cables, snakes, connectors, plates, and wiring.
- g. Other similar parts that may be required for normal operation such as projector bulbs and lenses.
- h. Mounts, rigging, and required hardware such as all-thread, unistrut, chains, and cables.
- i. System commissioning.
- j. Training.
- k. Documentation.

A/V equipment would be permanently installed on ceilings, walls, within cabinets, and/or within portable lecterns in each room to minimize system

setup time and enable ease of operation.

In spaces using identical A/V system equipment and/or controls, provide a common platform for ease of use for users moving between rooms. Integrated AV control systems with touch screen controllers shall be provided to simplify the control of complex equipment and/or functions, while providing the flexibility to support future changes in system operation.

All video distribution systems and presentation systems will be designed to support 4K/UHD resolution and the latest digital video standards and protocols. All signals inside secured spaces will be converted to fiber for routing between other secured spaces and systems. Several spaces will have operator's desks for controlling the AV presentations. Most of these desks will also have computers from different classifications. All the desks will be designed such that the proper separation can be achieved between these devices.

1.7.8 Components

All passive components of the communications distribution system, such as patch panels, interconnection cabling, patch cords, wire manager, termination backboards, communication racks/cabinets, outlet boxes and raceway systems, jacks, and connectors shall be included. Provide one horizontal wire manager for each patch panel installed and one vertical wire manager for each 2-post equipment rack installed.

Active electronic components associated with the enterprise network systems, such as computers, hubs, routers, telephone instruments, and other electronic LAN equipment will be provided and installed by the Government.

This project shall also install conduit and pull string to accommodate the CLIN options of the following systems:

- a. CCTV camera system as described in paragraph "CCTV" in section 01 86 26.
- b. Keyless Access Control System as described in paragraph "Keyless Access Control System(s) (ACS)" in section 01 86 26.
- c. Intrusion Detection System as described in paragraph "Intrusion Detection System(s) (IDS)" in section 01 86 26.

Wiring requirements for the above-listed items shall be coordinated through the COR.

1.7.9 Outlet Requirements

The standard telecommunications outlet for administrative spaces consists of 4 8-pin/8-position CAT 6 modular USOC RJ-45 jacks and 6 duplex LC connectors and adapters mounted in a single faceplate co-located with two duplex 120-VAC, 60-Hz general-purpose electrical receptacles. Refer to section 01 86 26 Electrical Requirements for additional information.

All NIPRNET drop identifiers in room data sheets (NIPRNET data drops, NIPRNET voice drops) describe the function only. Data and voice require

the same green CAT 6 cable and jacks, both connected to the same patch panels/network. All NIPR voice and data cables shall be routed to the communications room, all SIPR data cables shall be routed to the secure communications room.

1.7.10 Entrance Facility (EF)

The entrance facility (EF) will consist of the pathways, spaces, protection devices, and other equipment that will be used to connect building telecommunications infrastructure to outside plant cabling, access providers (AP), inter-building backbone and horizontal cabling and infrastructure. The EF shall meet the requirements of UFC 3-580-01, TIA 568.1, and TIA-569.

1.7.10.1 Building Protector Assemblies

Provide self-contained units supplied with a field cable stub factory connected to protector socket blocks to terminate and accept protector modules for outside cable. Building protector assembly shall have interconnecting hardware for connection to interior cabling at full capacity. Provide manufacturers instructions for building protector assembly installation.

1.7.10.2 Protector Modules

Provide, in accordance with UL 497, electrode gas tube or solid-state-type rated for the application. Gas tube protection modules shall be heavy duty, A>10kA, B>400, C>65A where A is the maximum single impulse discharge current, B is the impulse life and C is the AC discharge current in accordance with ANSI C62.61. The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils in accordance with UL 497. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

1.7.11 Telecommunications Room (TR)

All TRs will be sized according to the requirements for the service being provided and the size of the facility in accordance with UFC 3-580-01, TIA 568.1, and TIA-569, except that the minimum TR size for DoD buildings is 10 feet x 8 feet (3m x 2.4m). TRs shall be placed so that the maximum horizontal cable length to the farthest outlet shall not exceed 90 meters or 295 feet. If these limits need to be exceeded to provide service to any area of the building, additional TRs or telecommunications enclosures shall be required.

1.7.12 Patch Panels

Provide copper cabling patch panels in accordance with TIA-568-C.1, TIA-568.1 and TIA-568-C.2.

Panels shall be third party verified and shall comply with EIA/TIA Category 6 requirements. Panel shall be constructed of 0.09 inches minimum aluminum and shall be rack mounted and compatible with an ECIA EIA/ECA 310-E 19 inches equipment. Panel shall provide keyed or non-keyed (as indicated), 8-pin modular ports, wired to T568A. Patch panels shall terminate the building cabling on Type 110 IDCs and shall utilize a printed circuit board interface. The rear of each panel shall have incoming cable strain-relief and routing guides. Panels shall have each

port factory numbered and be equipped with laminated plastic nameplates above each port.

Provide fiber optic patch panels for maintenance and cross-connecting of optical fiber cables. Panel shall be constructed of 16 gauge steel or 11 gauge aluminum minimum and shall be rack mounted and compatible with a ECIA EIA/ECA 310-E 19 inches equipment rack. Each panel shall provide multimode or single-mode adapters as duplex LC in accordance with TIA-604-10 with zirconia ceramic alignment sleeves. The rear of each panel shall have a cable management tray a minimum of 8 inches deep with removable cover, incoming cable strain-relief and routing guides. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter.

Enough patch panels shall be installed to accomodate all installed cabling plus 25 percent spare.

1.7.13 Terminations

Terminate CAT6 UTP cable at the workstations to CAT6 rated RJ45 type jacks in accordance with TIA-568.1, TIA-568.2, and the TIA-568A wiring configuration. Terminate fiber optic cables at workstation locations to Duplex LC type connectors in accordance with TIA-568.3.

1.7.14 Backboards

Provide void-free, interior grade A-C plywood 3/4 inch thick 4 by 8 feet. Backboards shall be fire-rated by manufacturing process. Fire stamp shall be clearly visible. Backboards shall be provided on a minimum of two adjacent walls in the telecommunication spaces.

1.7.15 Racks and Cabinets

The contractor shall provide all racks required for this project. Refer to the room data sheets for rack locations. Racks shall be floor-mounted modular type, 16 gauge steel or 11 gauge aluminum construction, minimum, treated to resist corrosion. Provide rack with vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug. Racks shall be provided with surge protected power strip with 6 duplex 20 amp receptacles, input plug shall match receptacle type and configuration as indicated on plans. Racks shall be compatible with 19 inches panel mounting. Cabinets shall be freestanding modular type, 16 gauge steel or 11 gauge aluminum construction, minimum, treated to resist corrosion. Cabinet shall have removable and lockable side panels, front and rear doors, and have adjustable feet for leveling. Cabinet shall be vented in the roof and rear door. Cabinet shall be provided with surge protected power strip with 6 duplex 20 amp receptacles, input plug shall match receptacle type and configuration as indicated on plans. Cabinet shall have cable access in the roof and base and be compatible with 19 inch panel mounting.

1.7.16 Cable Tray

All distribution of cable throughout the buildings shall be via conduit and cable tray. All conduit and cable tray shall be installed above the drop ceiling or below the raised access flooring as required. The cable tray shall be a minimum of 12" (w) x 4" (d). Cable tray containing fiber

optic cabling shall have a solid bottom. Cable tray within the communications rooms shall be ladder type. Cable tray that passes through mechanical spaces shall be totally enclosed type with removable covers.

Provide 12 inches of clearance above cable trays for future access. Contractor must coordinate with other disciplines to ensure clearances can be achieved.

All cables shall be in minimum 1" EMT Conduit between the cable tray and outlet locations.

1.7.17 Labeling

Terminations shall be labeled and color-coded in accordance with UFC 3-580-01 and TIA-606.

1.8 TELECOMMUNICATIONS FACILITIES

1.8.1 Communications Hut

The installation of a new communications hut is required. The communications hut will be prefabricated and located in the area indicated on the drawings. The Contractor shall provide 5 full size 4-post racks/cabinets, horizontal and vertical cable management, ladder racking, and bonding/grounding system. All work shall be done in accordance with UFC-3-580-01, TIA-568, TIA-607, NFPA 70 and UFC 3-520-01.

In addition the the building will be environmentally controlled (redundant system)in accordance with TIA-569-C and ASHRAE TC 9.9, have a fire alarm and fire supression system, and lighting and power in accordance with UFC 3-530-01 and UFC 3-580-01.

1.8.2 Antenna Farm

An "antenna farm" consisting of a tower platform as specified in Section 01 82 00 ARCHITECTURAL REQUIREMENTS, pathway, cabling, and weather proof boxes is required. Cabling will include LMR-400 Coaxial cabling and CAT6 Twisted pair copper cabling. Pathway shall be conduit as specified in Section 01 86 26 ELECTRICAL REQUIREMENTS. The pathway will be routed between the "antenna farm" and the JUA server room. Cabling is to be terminated in JUA Server room on Rack 1 and on the antenna platform w/ bulkhead connectors in a lockable weatherproof box. Refer to Appendix H Facility ICD Annex A for further requirements.

1.9 Outside Plant (OSP)

Outside Plant (OSP) includes all cable pathways, splicing, trenching, plowing, pole mounting hardware, duct banks, cable vaults, hand holes, pull boxes, main distribution frames, and pedestals. All OSP work shall conform to TIA-758.

This project will include the following OSP:

a. Two 4-inch conduits with 3 cell mesh innerduct installed and routed from the newly installed "communications hut" to hand hole HH 62.

b. 3-Cell mesh innerduct with 12 strand SM fiber installed and routed

to the 319 CS node located in Building 607 from the "communications hut", utilizing existing pathway.

c. 3 cell mesh innerduct with 96 strand SM fiber installed through existing and new pathway and routed from the "communications hut" to the service entrance for B631.

d. Conduit pathway, Coaxial and Twisted Pair CAT6 cabling routed from the antenna platform to the JUA Server room in B631.

Service entrances for communications shall utilize 4-inch conduit with 3 cell mesh innerduct.

1.9.1 Exterior Construction Standards

Facilities are required to bring communication lines back to the nearest communication manhole/handhole.

- a. Duct bank shall consist of a 2 x 4" duct minimum, 4 inch, schedule 40 PVC, unless otherwise authorized by 319 CS. If duct bank is less than 36" below the surface, it shall be concrete encased. Duct bank underneath roads or parking areas shall be schedule 80 PVC.
- b. One 4" conduit shall contain innerduct. Innerduct authorized for use is either multi-celled mesh innerduct per 4" duct. Fiber is mandated to be installed in innerduct. All ducts to have pre-lubricated, measuring, pulling tape with a minimum breaking strength of 1,200 lbs (i.e. Mule Tape) secured at each end. When performing duct placement, new ducts shall be swept down and installed in the lowest available duct position within the lowest available duct window in the MH/HH.
- c. Install one tracer wire per duct bank. Place the tracer wire centered on the top duct formation. Tracer wire shall be terminated at MH/HH in the test well or in lip of ring. In this configuration the base locators will not have to enter the MH/HH. After installation, test the tracer wire to verify continuity of the tracer wire system and provide a continuity report.
- d. All underground cables shall include a maintenance loop and shall be labeled where it enters and exits the maintenance hole. Labeling shall be done in accordance with TIA-606.
- e. Provide tags for each telecommunications cable or wire located in manholes, handholes, and vaults. Handwritten labeling is unacceptable.
- f. Conduit from stub-ups inside of building to five feet from building exterior shall be steel.

Conduit systems will not exceed 500' between pull points and will not exceed a total of 180 degrees in bends between pull points. Pull points are manholes unless handholds are specifically authorized.

1.9.2 Cable Pulling

Test duct lines with a mandrel and swab out to remove foreign material before the pulling of cables. Avoid damage to cables in setting up pulling apparatus, or in placing tools or hardware. Do not step on cables when entering or leaving the manhole. Do not place cables in ducts other

than those shown, without prior written approval of the Contracting Officer. Roll cable reels in the direction indicated by the arrows painted on the reel flanges. Set up cable reels on the same side of the manhole as the conduit section in which the cable is to be placed. Level the reel and bring into proper alignment with the conduit section so that the cable pays off from the top of the reel in a long, smooth bend into the duct without twisting. Under no circumstances shall the cable be paid off from the bottom of a reel. Check the equipment set up prior to beginning the cable pulling to avoid an interruption once pulling has started. Use a cable feeder guide of suitable dimensions between cable reel and face of duct to protect cable and guide cable into the duct as it is paid off the reel. As cable is paid off the reel, lubricate and inspect cable for sheath defects. When defects are noticed, stop pulling operations and notify the Contracting Officer to determine required corrective action. Cable pulling shall also be stopped when reel binds or does not pay off freely. Rectify cause of binding before resuming pulling operations. Provide cable lubricants recommended by the cable manufacturer. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

1.9.2.1 Pulling Eyes

Equip cables 1.25 inches in diameter and larger with cable manufacturer's factory installed pulling-in eyes. Provide cables with diameter smaller than 1.25 inches with heat shrinkable type end caps or seals on cable ends when using cable pulling grips. Rings to prevent grip from slipping shall not be beaten into the cable sheath. Use a swivel of 3/4 inch links between pulling-in eyes or grips and pulling strand.

1.9.3 Maintenance Holes (MH) and Hand Holes (HH)

The size of a maintenance hole shall be specified to include the ultimate duct structure capacity and the need for equipment located in the maintenance hole.. The lid must be cast to say "COMMUNICATIONS," and all materials installed in the manhole will be resistant to corrosion or rust. A handhole shall not exceed 1.2 m (4 ft) in length by 1.2 m (4 ft) in width by 1.2 m (4 ft) depth and should not be used in runs of more than three trade size 103 (trade size 4) conduits. A handhole shall not be used in place of a maintenance hole.

- a. MH/HH placement and specifications shall be in accordance with base guidelines. Additional requirements for every newly installed standard MH/HH shall include an approved galvanized ladder, support bar and C-Steps.
- b. All newly constructed MH/HH and duct banks shall have a 12 AWG insulated solid copper tracer wire installed with them and terminated either on a test lug inside the MH/HH lip or at the test well located directly adjacent to MH/HH.
- c. MH/HH shall be stenciled in accordance with local guidelines.
- d. All maintenance holes and hand holes shall have a ground rod and bonding ribbon in accordance with base guidelines.
- e. Horizontal Unistrut channels are the preferred method of anchoring the vertical cable racks in the MH.

1.9.4 Fiber Optic Cable Specifications

Provide single-mode fiber optic cable. Provide optical fibers as indicated. Fiber optic cable shall be specifically designed for outside use with loose buffer construction. Provide fiber optic color code in accordance with TIA/EIA-598

Provide strength members with sufficient tensile strength for installation and residual-rated loads to meet the applicable performance requirements in accordance with ICEA S-87-640. The strength member is included to serve as a cable core foundation to reduce strain on the fibers, and shall not serve as a pulling strength member.

- a. The type of protective covering required for fiber optic cables installed in a variety of methods and differing environments situations are identified in Table below.

Table 1.4.4: Protective of Fiber Optic Cable		
	JACKET LAYERS	ARMOR
DIRECT BURIAL	Double	Double
DUCT BANK	Single	Single
CONCRETE ENCASED DUCT BANK	Single	Dielectric

- b. All new terminating connectors for fiber optic cable shall be LC connector.

1.10 Splices Cases and Splicing Standards

1.10.1 General

When existing copper splice cases are re-entered to place an additional cable, the entry end cap and all sealing tape on the cable going through that end cap shall be replaced followed by the closing of the case. Depending on the type of case and manufacturer's recommendations, a sustainment test shall be performed by pressurizing the splice case. Filled splice cases are not the preferred method of installation. Do not place re-enterable compound in a splice case. All end plates will be "Field Drilled" to ensure proper cable sizing and proper tape layering.

1.10.2 In Vault or Manhole

Provide underground closure suitable to house splice organizer in a protective housing, into which can be poured an encapsulating compound. Closure shall be of thermoplastic, thermoset, or stainless steel material supplying the structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Encapsulating compound shall be reenterable and shall not alter the chemical stability of the closure.

1.10.3 Shield Connectors

Provide connectors with a stable, low-impedance electrical connection between the cable shield and the bonding conductor in accordance with RUS Bull 345-65.

1.10.4 Grounding and Bonding Conductors

Provide grounding and bonding conductors in accordance with RUS 1755.200, TIA-607, IEEE C2, and NFPA 70. Solid, bare, copper wire meeting the requirements of ASTM B1 for sizes No. 8 AWG and smaller, and stranded, bare, copper wire meeting the requirements of ASTM B8, for sizes No. 6 AWG and larger. Insulated conductors shall have 600-volt, Type TW insulation meeting the requirements of UL 83.

1.11 Conduit

Provide conduit as specified in Section 01 86 26 ELECTRICAL REQUIREMENTS.

PART 2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.1 Testing

Test 100 percent OTDR test of FO media at the factory in accordance with TIA-568.3. Use TIA-526-14 Method B for multi mode fiber measurements. Calibrate OTDR to show anomalies of 0.2 dB minimum. Submit test reports, including manufacture date for each cable reel, and receive approval before delivery of cable to the project site.

2.1.1 Quality Control and Acceptance Testing

Perform acceptance testing in accordance with RUS Bull 1753F-201, and as further specified in this section. Provide personnel, equipment, instrumentation, and supplies necessary to perform required testing. Notification of any planned testing shall be given to the Contracting Officer at least 14 days prior to any test unless specified otherwise. Testing shall not proceed until after the Contractor has received written Contracting Officer's approval of the test plans as specified. Test plans shall define the tests required to ensure that the system meets technical, operational, and performance specifications. The test plans shall define milestones for the tests, equipment, personnel, facilities, and supplies required. The test plans shall identify the capabilities and functions to be tested. Provide test reports in booklet form showing all field tests performed, upon completion and testing of the installed system. Measurements shall be tabulated on a pair by pair or strand by strand basis.

- a. Contractor shall submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation
- b. All testing shall be conducted using TIA/EIA standards and with all equipment within current manufacturer's recommended time frame for calibration. A copy of the calibration certification shall be carried with all equipment and be presented upon request by 319CS designated representative (PM or QA). If equipment is not within current manufacturer's recommended time frame, test results shall be rejected by the 319CS and no telecommunication services will be activated in

the tested facility until corrected and retested.

c. OSP Cable Testing

OSP Fiber Optic Cable

All OSP fiber strands shall be tested with OTDR and power meter/light source. OTDR shall be dual frequency, launch and receive, cable. Power meter/light source shall be dual frequency/bi-directional.

- d. OTDR Test: The OTDR test shall be used to determine the adequacy of the cable installations by showing any irregularities, such as discontinuities, micro-bendings or improper splices for the cable span under test. Hard copy fiber signature records shall be obtained from the OTDR for each fiber in each span and shall be included in the test results. The OTDR test shall be measured in both directions. A reference length of fiber, 66 feet minimum, used as the delay line shall be placed before the new end connector and after the far end patch panel connectors for inspection of connector signature. Conduct OTDR test and provide calculation or interpretation of results for single-mode fiber. Splice losses shall not exceed 1.0 db.
- e. Attenuation Test: End-to-end attenuation measurements shall be made on all fibers, in both directions, using a 1550 nanometer light source at one end, and the optical power meter on the other end, to verify that the cable system attenuation requirements are met in accordance with TIA-526-14 for single-mode fiber optic cables. The measurement method shall be in accordance with TIA-455-78-B. Attenuation losses shall not exceed 0.5 db/km at 1310 nm and 0.4 db/km at 1550 nm for single-mode fiber.
- f. Bandwidth Test: The end-to-end bandwidth of all single-mode fiber span links shall be measured by the frequency domain method. The bandwidth shall be measured in both directions on all fibers. The bandwidth measurements shall be in accordance with TIA/EIA-455-204.
- g. Test Result Formatting
 - 1. All test results can be submitted in softcopy format in original form and PDF.
 - 2. All failed readings found require a description of corrective actions taken.
 - 3. Test plans, test results, test equipment calibration certification and test documentation shall be included in the record drawing set. A copy of the test document shall be received in the NEC at a minimum of 10 days prior to pre-final inspection of facility or building complex (2 or more buildings sharing infrastructure resources).

2.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination, but prior to being cross-connected.

2.1.3 Performance Tests

Perform testing for each outlet as follows:

- a. Perform Category 6 link tests in accordance with TIA-568.1 and TIA-568.2. Tests shall include wire map, length, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propagation delay, and delay skew.
- b. Optical Fiber Links. Perform optical fiber end-to-end link tests in accordance with TIA-568.3.

2.1.4 Final Verification Tests

Perform verification tests for UTP and optical fiber systems after the complete telecommunications cabling and workstation outlet/connectors are installed.

2.2 Cable Inspection

Promptly repair indicated utility lines or systems damaged during site preparation and construction. Damages to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the Contract Clauses. When Contractor is advised in writing of the location of a nonindicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In every event, immediately notify the Contracting Officer of damage.

Handle cable and wire provided in the construction of this project with care. Inspect cable reels for cuts, nicks or other damage. Damaged cable shall be replaced or repaired to the satisfaction of the Contracting Officer. Reel wraps shall remain intact on the reel until the cable is ready for placement.

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PART 1 SITE WORK

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1.1 REFERENCES

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(AASHTO)

AASHTO GDHS-5 (2011, Errata 2012) A Policy on Geometric
Design of Highways and Streets

AASHTO HB-17 (2002; Errata 2003; Errata 2005, 17th
Edition) Standard Specifications for
Highway Bridges

ASTM INTERNATIONAL (ASTM)

ASTM D977 (2019a; E 2019) Standard Specification for
Emulsified Asphalt

ASTM C131/C131M (2020) Standard Test Method for Resistance
to Degradation of Small-Size Coarse
Aggregate by Abrasion and Impact in the
Los Angeles Machine

ASTM D2027/D2027M (2019) Cutback Asphalt (Medium-Curing Type)

ASTM D2028/D2028M (2015) Cutback Asphalt (Rapid-Curing Type)

ASTM D2397/D2397M (2019a) Standard Specification for
Cationic Emulsified Asphalt

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA M17 (1989) Installation, Field Testing, and
Maintenance of Fire Hydrants

AWWA C651 (2014) Standard for Disinfecting Water
Mains

CODE OF FEDERAL REGULATIONS (CFR)

28 CFR Part 36 ADA Standards for Accessible Design

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 841-B-09-001 (2009) Technical Guidance on Implementing
the Stormwater Runoff Requirements for
Federal Projects under Section 438 of the

Energy Independence and Security Act

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 130	(2001) Standard Recommended Practice for Estimating Scratch Hardness of Coarse Aggregate Particles
EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual
EM 1110-1-1002	(2012) Survey Markers and Monumentations

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2020) Enclosures for Electrical Equipment (1000 Volts Maximum)
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2022) Standard for the Installation of Private Fire Service Mains and Their Appurtenances
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

NWS HYDRO-35	(June 1977) Five to 60-Minute Precipitation Frequency For The Eastern and Central United States
NOAA ATLAS 2	(1973) Precipitation-Frequency Atlas of the Western United States

STATE OF NORTH DAKOTA SPECIFICATIONS

NDDOT	North Dakota Standard Specifications, latest edition
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U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3.201-01	(1 April 2021) Civil Engineering, with Change 5
UFC 3-230-01	(1 April 2021) Water Storage and Distribution, with Change 2
UFC 3-240-01	(1 Jan 2021) Wastewater Collection and Treatment, with Change 2
UFC 3-250-01	(14 Nov 16) Pavement Design for Roads and Parking Areas
UFC 3-250-08FA	(16 Jan 04) Standard Practice For Sealing Joints and Cracks in Rigid and Flexible Pavements
UFC 3-250-09FA	(16 Jan 04) Design: Aggregate Surfaced Roads and Airfields

UFC 3-600-01 (6 May 2021) Fire Protection Engineering
For Facilities, with Change 6

UFC 4-010-01 (19 Aug 2021) DoD Minimum Antiterrorism
Standards for Buildings, with Change 1

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD (2009) Manual of Uniform Traffic Control
Devices

1.2 OMAHA DISTRICT CORPS OF ENGINEERS STANDARD DETAILS AND CADD CELLS.

The Omaha District's Civil and Environmental CADD standard details and cells are available upon request after Contract award. See website identified in Section 01 33 00.32 DESIGN AND CONSTRUCTION DELIVERABLES/PROCEDURES. These standards and cells are available for the Contractor's use. References to using exact details and drawings are found in this section. In those cases, the Contractor shall use the referenced standard drawings and/or details.

1.3 GOVERNMENT-SUPPLIED ENGINEERING SURVEY

The Contractor shall use Government supplied survey data in the preparation of their proposal and design. An engineering field survey has been performed and data is available to the Contractor, furnished with this solicitation. The survey CADD files are in English units and AutoCAD 2022 format as well as Microstation Connect format. A Microstation Digital Terrain Model (dtm) as well as a Triangulated Irregular Network (tin) of the survey is also included with the CADD files. The field survey data information was gathered by a topographical survey performed in September 2022. Contours were gathered at 1-foot intervals. Below grade utility data was obtained from "best-available" as-built mapping. **Government provided survey drawings are provided to assist the Contractor in preparing their proposal. Any errors identified shall be brought to the attention of the Contracting Officer immediately for resolution and direction. The Contractor shall take all professionally prudent and reasonable actions to verify the accuracy of the data provided. During design and construction, the Contractor shall be responsible for obtaining any additional data necessary for the execution of this project.**

1.3.1 Setting of Surveying Monuments

The Contractor shall set two permanent surveying monuments on the project site in accordance with this paragraph. The monuments will be established to second order horizontal and vertical control. The Contracting Officer shall approve the actual monument locations prior to establishment. Monuments will be Type G monument per EM 1110-1-1002. Field notes, as well as final monument horizontal and vertical coordinates shall be provided to the Contracting Officer. All set/recovered monumentation shall be entered into the U-SMART database. A copy of the published datasheet shall be supplied to the Contracting Officer.

1.3.2 Ground Control

The survey was developed using North Dakota State Plane Coordinate System North Zone. The horizontal and vertical control reference datum's were NAD 83 and NAVD 88 respectively. All final supplied results are in True

State Plane at zero elevation.

1.3.3 As-Built Conditions

Survey of As-Built Utility Lines. All new underground utility lines (including, if applicable to new construction, electrical power and communications, gas, water, sanitary sewer, storm drains, roof drains and culverts) shall be located by the Contractor during installation using surveying equipment. The Contractor shall survey (if applicable to new construction) pipe invert of gas, water, sanitary sewer, storm drains, roof drains and culverts and top of duct bank of electrical power and communications lines. Storm drains and sanitary sewer lines shall be surveyed where pipes enter manholes and inlets and at 100-foot maximum intervals along the line. The inverts of all cleanouts and tees shall be surveyed. Inverts at each end of culverts shall be surveyed. Electrical power, communications, gas and water lines shall be surveyed at all manholes, tees, valves, corners, changes in direction and at intervals along the line which will accurately depict the location of the line in both horizontal and vertical directions (50-foot maximum interval). Survey accuracy shall meet or exceed National Map Standards for 1"-50' mapping. Survey shall be in North Dakota State Plane Coordinate System North Zone. The horizontal and vertical control reference datum's shall be NAD 83 and NAVD 88 respectively.

1.4 CONTRACTOR'S STAGING AREA AND ACCESS ROUTE

1.4.1 Storage Area

The Contractor's staging area shall be located as shown on the Concept Drawings. Two options for location are shown and the Contractor may choose the option that best meets the construction plan. Regardless of the option chosen, the staging area shall be returned to it's original condition upon completion of construction, with the exception to if Option 1 is chosen, the access drive between the two parking lots shall be converted to a permanent fire entrance/lane. See Concept Drawings for location.

1.4.2 Contractor's Access Route

The Contractor's access route to the project location shall be as shown on the Concept Drawings. Contractor's parking areas shall be located near the staging areas. The Contractor shall coordinate with Base Security if access to the site is modified based on FPCON level at the base.

1.4.3 Contractor's Stockpile Area/Borrow Site

Stockpile and borrow sites are not available on the base.

1.4.4 Project Sign

Contractor shall provide a project sign in accordance to Omaha District Standard Drawing C-8.2 PROJECT SIGN DETAILS.

1.5 DEMOLITION AND REMOVAL

The Contractor shall remove all pavements, utilities and other appurtenances necessary to construct the new facility . Unless otherwise specified, disposal of all removed materials shall be outside the limits of Government-controlled lands in accordance with federal, state, and

local regulations. The Contractor shall notify the Contracting Officer if any material to be disposed of is found to contain hazardous, toxic, biological or radiological substances. Rubbish and debris shall be removed from Government property daily to avoid accumulation at the project site.

1.5.1 Pavement Removals/Utility Protection

The Contractor shall avoid installing utilities underneath existing streets, sidewalks, and parking areas. The Contractor shall not install any utilities underneath buildings. In cases where it is necessary for the utilities to cross existing undisturbed streets, sidewalks, and parking lots, the Contractor shall install the lines using trenchless methods. No open trenching will be allowed unless written permission is obtained and approved by the Contracting Officer. Open trenching may be used beneath existing roads that are scheduled for removal, relocation or reconstruction. When open trench methods are approved, streets, sidewalks, and parking lots shall be sawcut, removed and replaced. Portions of walks and concrete pavements requiring removal shall be removed to the nearest joint.

1.5.2 Utility Interference

All existing utilities, including but not limited to storm drain, electrical power, sewer, gas, water, and communication lines that are impacted during the construction of this project shall remain in service. If this is not feasible, all outages shall be coordinated with the Contracting Officer. All underground utilities from field data and surveys, site investigations, and digging permit locates, shall be marked within and adjacent to areas of the work. All work areas shall be investigated with detection devices for cables and pipelines, to confirm locations, identify unknown utilities, and establish depths. All underground utilities potentially disturbed by the work shall be located by hand digging or vacuum excavation prior to mechanical trenching or excavating in the vicinity. The Contracting Officer shall be notified of detection activities 48 hours in advance. Detection devices shall be on-site at all times.

1.6 NEW CONSTRUCTION

All new construction is located entirely within the limits of Government-controlled lands. The design drawings shall be developed using the same vertical and horizontal datum's as the engineering survey.

1.6.1 Buildings

Location and construction of the new communication building ("Comm. Hut") and adjacent mechanical yard, including associated utilities and sidewalk shall be as indicated on the drawings and as specified herein. However, the exact location may be revised slightly by the Contractor as needed to accommodate the final project layout. All site layout changes shall be subject to approval by the Government. **Government supplied Concept Plans are provided to assist the Contractor in the preparation of their proposal and design. The site plans are available to the Contractor with this solicitation. Any errors identified shall be brought to the attention of the Contracting Officer immediately for resolution and direction. The Contractor shall take all professionally prudent and reasonable actions to verify the accuracy of the data provided. The**

Contractor shall be responsible for final site plans.

1.6.2 Walks

Exterior P.C. concrete walks shall be placed at the locations and widths as shown on the drawings. However, the exact location may be revised slightly by the Contractor as needed to accommodate the final project layout. All site layout changes shall be subject to approval by the Government. Walks accessing the handicapped entrances shall meet the requirements of the American Disability Act with respect to width and grade.

1.6.3 Landscaping

Landscaping will be limited to the repair of existing rock mulch areas if disturbed and seeding of all disturbed areas not otherwise surfaced.

1.6.4 Turf

1.6.4.1 Soil Preparation

Prior to seeding or sodding, all surface soils shall be loosened to a minimum depth of 12 inches and broken up to a fine, workable texture suitable for seeding and sodding. Areas within the limits of sod and irrigation shall have 3 cubic yards per 1000 square feet of a 50/50 mixture of peat moss and manure worked into the top 6 inches of soil.

1.6.4.2 Seeding and Sodding

All disturbed areas, including those disturbed by contractor's staging activities, not otherwise surfaced, shall be seeded. All newly turfed areas shall be fertilized with no less than 200 lbs of 18-46-0 per acre of fertilizer. Seeding and sodding shall be specified in Sections 32 92 19 SEEDING.

1.6.4.3 Seeding

Seed grass species shall be determined during the design process and shall be approved by the installation.

Moldy, or otherwise damaged seed shall be rejected. Seed mixing shall be performed by the seed supplier prior to delivery to the site. Bulk quantities of seed shall be labeled. All seeded areas shall be seeded by hydromulching techniques using 2000 lbs of green-tinted, wood-fiber hydromulch per acre, drilling with a Brillon-type seeder or broadcast seeded. All seeded areas shall be watered by the Contractor with a temporary watering system for a 90-day establishment period. Contractor shall design the temporary system. Areas shall be watered as required for the ground to remain consistently moist during the first three weeks of sprinkling. Beginning with the fourth week of sprinkling, the areas shall be watered every other day, delivering 1/2 inch of water to the ground for each water day, for the remainder of the 90-day period.

1.7 CONSTRUCTION AREA/SAFETY FENCING.

The Contractor shall maintain a construction area fence throughout the duration of the contract. Fence shall be 4 feet tall orange plastic with gates. The fence shall be located such that the entire project site is fenced. Upon completion of construction, all fence materials shall be disposed of outside the limits of Government-controlled lands.

1.8 PAVEMENTS

1.8.1 Pavement Removal and Replacement for Utilities

Where new utilities will be installed across existing pavements using open trench method, existing pavement shall be removed and replaced to original thickness. New bituminous and p.c. concrete pavement shall overlap at least 12 inches over existing base course.

1.8.2 Pavement and Sidewalk

Pavements shall be constructed in accordance with the following guide specifications. Unless otherwise specified, unit price clauses in specifications shall be deleted.

1.8.2.1 Rigid Pavement Base Course

Rigid pavement base course shall conform to the requirements found in Omaha District guide specification Section 32 10 00.04 (NORTH DAKOTA) PAVEMENTS FOR SMALL PROJECTS . The gradation will also meet the requirements in UFC 3-250-01 for pavement design for frost conditions.

1.8.2.2 P.C. Concrete Pavement

P.C. concrete shall conform to the requirements in the Omaha District guide specification Section 32 10 00.04 (NORTH DAKOTA) PAVEMENTS FOR SMALL PROJECTS and shall have a minimum compressive strength of 3000 psi at 28 days age.

1.8.2.3 Joint Sealing

Field molded joint sealant shall be specified in the Omaha District guide specification Section 32 10 00.04 (NORTH DAKOTA) PAVEMENTS FOR SMALL PROJECTS .

1.8.2.4 Concrete Sidewalks and Curbs and Gutters

Concrete sidewalks and curbs and gutters shall be specified in Omaha District guide specification Section 32 10 00.04 (NORTH DAKOTA) PAVEMENTS FOR SMALL PROJECTS . Curb and gutter cross section shall match existing.

1.9 GRADING

1.9.1 General

Positive drainage shall be provided for all areas and existing drainage ways shall be utilized to the extent possible. It is desirable to direct drainage away from buildings to curb and gutter or road ditches. Swales between buildings and parking areas shall be avoided, if possible. Parking areas shall be graded such that storm water is directed off to the sides, with curbs and gutters to control drainage, and not down the center of the parking area, where possible. Earthwork shall be balanced to the extent possible without compromising the design. The number of existing trees to be removed shall be kept to a minimum. No grading shall be done within driplines of existing trees to be preserved. Grading shall be specified in Section 31 00 00 EARTHWORK. The Contractor shall be responsible for editing the specification for the project.

1.9.2 Adjustment of Existing Structures

All manholes, valve boxes, or inlets of any nature within the project that do not conform to the new finish grade in either surfaced or unsurfaced areas shall be adjusted to the new finish grade. Where inlets, manholes, or valve boxes fall within a surfaced or unpaved roadway or parking, the existing frames and cover shall be removed and replaced with a heavy-duty frame and cover. The structure shall be adjusted as needed to fit the new conditions. All structures shall be of a type suitable for the intended use and shall conform to the requirements of the applicable section of these specifications.

1.9.3 Borrow and Waste

Borrow materials shall be obtained from sources outside the limits of Government-controlled land. The source of borrow material shall be the Contractor's responsibility. The Contractor shall obtain from the owners the right to procure material, shall pay all royalties and other charges involved, and shall bear all the expense of developing the sources, including rights-of-way for hauling. Surplus excavated material not required for fill shall be disposed of by the Contractor at his own expense and responsibility outside the limits of Government-controlled land.

1.9.4 Sidewalks

Concrete walks shall have a transverse grade of 2 percent. Maximum longitudinal walk grade shall be 10 percent in freezing climates and 15 percent in non-freezing climates. Walks designed to provide a handicapped accessible route shall conform to 28 CFR Part 36 ADA Standards for Accessible Design. Special attention shall be given to sidewalks that are on the north (shaded) side of buildings. These walks should be designed to ensure a freeze/thaw cycle does not result in the formation of ice on the walk. Ice on walks should be a safety consideration for all areas. Double purpose walks are a combination of a straight curb and a concrete walk. Their use shall be limited to area where the drainage flows away from the curb line or gutter.

1.9.5 Stairs

The use of stairs in sidewalks will be avoided whenever possible. When stairs are unavoidable, they should have at least three risers and shall be provided with handrails. All steps within a stair shall have a uniform tread width and riser height. Risers shall have a height of 4.5 to 6 inches and treads shall have a width of 12 to 17 inches. Treads should slope 2 percent for positive drainage. The height between landings shall be kept to a maximum of 5 feet to allow a view of the next higher landing whenever possible. The height between landings shall not exceed 12 feet. Landings shall be at least 4 feet long.

1.9.6 Road and Street Longitudinal Grades

Desirable and absolute maximum grades shall be in accordance with Table 1-1 and 1-2 of UFC 3-250-18FA. Use of longitudinal road and street grades greater than 7 percent shall be subject to approval by the Government.

1.9.7 Gutter Grades

- a. Desirable minimum of 0.8 percent.

- b. Absolute minimum of 0.5 percent.

1.9.8 Building Floor Elevation

Building finished floor elevation shall be set to ensure that the required minimum and maximum grades are met. Buildings shall not be constructed within a 100-year floodway. First floor of new buildings shall be constructed a minimum of 1 foot above the 100-year flood plain elevation.

1.9.9 Grades Away From Building

- a. Minimum of 5 percent for 10 feet.
- b. Maximum of 10 percent for 10 feet.

1.9.10 Overlot Grades

- a. Minimum 1 percent for cohesionless sandy soils.
- b. Minimum 2 percent for cohesive soils or turfed areas.
- c. Sideslopes for ditches, roads, and other turfed areas shall be no steeper than 1V on 3H.

1.10 STORM DRAINAGE

1.10.1 Stormwater Management

For projects which disturb more than 5,000 square feet, the Contractor shall maintain or restore, to the maximum extent technically feasible (METF), the predevelopment hydrology of the project site with regard to the temperature, rate, volume, and duration of flow as required by Section 438 of the Energy Independent and Security Act of 2007 (EISA). The predevelopment hydrology refers to the historic condition prior to any site development. The Contractor shall incorporate either of the two options described in EPA 841-B-09-001 to the METF in order to comply with Section 438. The Contractor shall document in the design analysis that the stormwater strategies included in the design meet the requirements of Section 438 to the METF. Documentation of technical infeasibility should include, but may not be limited to, engineering calculations, geologic reports, hydrologic analyses, and site maps. A determination that the performance design goals cannot be met on site should include analyses that rule out the use of an adequate combination of infiltration, evapotranspiration, and use measures.

1.10.2 Determination of Storm Runoff

Determination of peak discharges for smaller drainage areas shall be accomplished using the Rational Method presented in UFC 3-230-01. The Rational Method may not be used for drainage areas more than 200 acres. The minimum time of concentration for turfed or paved areas shall be 5 minutes. For larger areas or where detailed consideration of ponding is required, computation should be by unit-hydrograph and flow-routing procedures such as HEC-HMS.

1.10.2.1 Design Storm Return Period

Storm drains shall be sized for a design storm with a return period of 10 years. Provisions shall be made to protect all buildings and critical

structures from a major storm event with a return period of 100 years.

1.10.2.2 Rainfall Depth-Duration-Frequency Data

Rainfall data for states in the western United States shall be obtained from NOAA ATLAS 2. Rainfall data for states in the eastern United States shall be obtained from NWS HYDRO-35. Rainfall intensity-duration data developed by cities or regions may be used if available.

1.10.3 Storm Drainage System Design

If applicable, the Contractor shall be responsible for design of the storm drainage system. The storm drainage system shall be specified in Section 33 40 00 STORM DRAINAGE UTILITIES. Submittals of pipe samples is not required. The storm drainage system shall be designed so as to minimize the number of drainage structures required. Structures shall be located at all changes in direction of storm drain line, at the intersection of two or more storm drain lines, and where required to intercept rainfall runoff. The maximum distance between drainage structures shall be approximately 300 feet for conduits less than 30 inches in diameter. The maximum distance between drainage structures shall be approximately 500 feet for conduits 30 inches and greater in diameter. Storm runoff in streets and parking areas with curbing shall be collected using curb inlets or area inlets. The use of curb openings with flumes to drain water from parking streets and parking areas with curbing will not be permitted unless approved by the Government. Drainage of runoff from turfed areas onto pavements shall be minimized. Where possible, a minimum drop of 0.2 feet between inverts of equal diameter storm drain pipes shall be provided at the centerline of drainage structures. Where storm drain pipes are of different diameters, the pipe crown elevations should be matched at the drainage structure. Storm drain pipes shall have a minimum diameter of 12 inches. Storm drain lines shall be located outside of paved areas to the extent possible. Under no circumstance shall storm drain lines be located beneath buildings.

1.10.3.1 Hydraulic Design

New storm drain pipes shall be designed for gravity flow during the 10-year design storm unless otherwise approved by the Government. The hydraulic grade line shall be calculated for the storm drain system and all energy losses accounted for. Storm drain systems shall be designed to provide a minimum flow velocity of 2.5 feet per second when the drains are one-third or more full.

1.10.3.2 Manholes

Diameter of manholes shall be large enough to accommodate pipes entering/exiting the manhole. Manhole cast iron frames shall have a minimum opening diameter of 24 inches. Galvanized steel ladders shall be provided in all manholes with a depth exceeding 12 feet in accordance with Section 33 40 00 STORM DRAINAGE UTILITIES.

1.10.3.3 Area Inlets

Area inlets shall be properly sized and designed to accommodate the design flows.

1.10.3.4 Curb Inlets

Locating parking area curb inlets at building entrances shall be avoided if possible. Curb inlets along two-lane streets shall be spaced and sized so that the flow in the gutter and ponded areas at low points do not cover the crown of the street.

1.10.4 Storm Drain Pipe

The Contractor shall select the appropriate storm drain pipe materials from the options specified in Section 33 40 00 STORM DRAINAGE UTILITIES. Pipe, bedding, and backfill shall be of adequate strength (or stiffness) to support the earth, live, and construction loads imposed on the pipe. Only pipe materials which have a minimum design service life of 50 years shall be allowed for permanent installations. As a minimum, all pipe joints shall be soiltight. The Contractor shall specify watertight pipe joints and flexible resilient pipe connectors at drainage structures when the water table is at or above the pipeline.

1.10.4.1 Concrete Pipe

Reinforced concrete pipe shall be a minimum Class III. Type I cement may be used only when sulfates in the soil are 0.1 percent or less and dissolved sulfates in the effluent are 150 ppm or less. Type II cement may be used only when sulfates in the soil are 0.2 percent or less and dissolved sulfates in the effluent are 1,500 ppm or less. Only Type V cement may be used if sulfates in the soil exceed 0.2 percent or dissolved sulfates in the effluent exceed 1,500 ppm. Concrete pipe shall be assumed to have a minimum design service life of 50 years unless the Contractor determines that conditions at the site will reduce the service life. Concrete culverts and storm drains shall be protected by a minimum of 3 feet of cover during construction to prevent damage before permitting heavy construction equipment to pass over them during construction.

1.10.4.2 Corrugated Metal Pipe

The service life of corrugated metal pipe shall be the sum of the lives of the nonmetallic protective coating, the metallic protective coating, and the basic metal pipe. The life of the basic metal pipe and metallic protective coating shall be the time to first perforation. The time to first perforation for corrugated steel pipe shall be determined using the California Chart (California Division of Highways Test Method 643-B). Corrugated metal pipe shall not be allowed in areas where previous satisfactory service has not been achieved. Zinc-coated corrugated steel pipe shall not be allowed if the soil and water pH is less than 6 or greater than 8 or the minimum soil resistivity for the site is less than 2,500 ohm-cm. Aluminum-coated corrugated steel pipe shall not be allowed if the soil and water pH is less than 6 or greater than 9 or the minimum soil resistivity for the site is less than 1,500 ohm-cm. Bituminous coatings shall have a maximum allowable add-on service life of 10 years on the soil side and 2 to 10 years on the water side of the pipe. Stiffness of the corrugated metal pipe and soil envelope shall be such that the predicted long-term deflection shall not exceed 5.0 percent. Corrugated metal culverts and storm drains shall be protected by a minimum cover as recommended in Section 26 of AASHTO HB-17 during construction to prevent damage before permitting heavy construction equipment to pass over them during construction.

1.10.4.3 Plastic Pipe

Stiffness of the plastic pipe and soil envelope shall be such that the predicted long-term deflection shall not exceed 7.5 percent. Plastic culverts and storm drains shall be protected by a minimum of 3 feet of cover during construction to prevent damage before permitting heavy construction equipment to pass over them during construction. Split couplers shall not be allowed for corrugated high-density polyethylene pipe. Plastic pipe shall be assumed to have a minimum design service life of 50 years unless the Contractor determines that conditions at the site will reduce the service life.

1.11 EROSION AND SEDIMENT CONTROL

The Contractor shall be responsible for selecting and implementing Best Management Practices (BMPs) to minimize pollutants in storm water discharges associated with construction activity at the construction site. All erosion and sediment measures and other protective measures shall be maintained by the Contractor in effective operating condition. All temporary structural practices shall be removed once the corresponding disturbed drainage area has been permanently stabilized. The Contractor shall comply with the requirements in Omaha District guide specification Sections 01 57 20.00.10 ENVIRONMENTAL PROTECTION and 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. If the project requires coverage under a National Pollution Discharge Elimination System (NPDES) general permit for storm water discharges associated with construction activity, the Contractor shall comply with the requirements in Omaha District guide specification Section 01 41 26.06 24 (NORTH DAKOTA) NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES.

1.11.1 Temporary Construction Entrance

Tracking of mud from the construction site onto adjacent roads and streets shall be kept to a minimum. A temporary stabilized stone pad shall be constructed at points where vehicular traffic will be leaving the construction site and moving directly onto a paved road or street. It shall extend the full width of the vehicular ingress and egress area and have a minimum length of 70 feet. The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto adjacent roads or streets. If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the stone, the tires of the vehicles shall be washed before entering the road or street. Any mud which is tracked onto roads or streets shall be removed at least once daily.

1.11.2 Seeding and Sodding

All areas disturbed by construction and not otherwise surfaced shall be seeded or sodded.

1.11.3 Erosion Control Blanket

Bottoms and sideslopes of ditches and any other disturbed slopes 1V on 3H or steeper shall be covered with an erosion control blanket immediately after seeding.

1.11.4 Silt Fence

Silt fencing shall be installed below disturbed areas where erosion would

occur in the form of sheet and rill erosion. The size of the drainage area above the silt fence shall not exceed one fourth of an acre per 100 feet of silt fence length. Silt fencing may be installed across ditches only when the maximum contributing drainage area is not greater than 1 acre. Silt fence constructed across a ditch shall have wire support and shall be of sufficient length to eliminate endflow.

1.11.5 Straw Bale Barrier

Straw bale barriers may not be installed across ditches.

1.11.6 Outlet Protection

Preformed riprap lined scour holes or other suitable measures shall be installed at outlets of culverts and storm drains as needed to prevent erosion.

1.11.7 Storm Drain Inlet Protection

Storm drain inlet protection shall be installed around any new or existing storm drain inlets that will become operational before permanent stabilization of the corresponding disturbed drainage area has occurred. Storm drain inlet protection shall include either a sediment filter or an excavated area around the storm drain inlet.

1.11.8 Rock Check Dam

Rock check dams may be installed in ditches which drain 2 to 10 acres. The allowable drainage area will be dependent on the gradation of the rock used to construct the check dam. The maximum height of the dam shall be 3 feet. The center of the dam shall be at least 6 inches lower than the outer edges. For added stability, the base of the check dam may be keyed into the soil approximately 6 inches. The maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

1.11.9 Temporary Sediment Trap

Temporary sediment traps may be constructed below disturbed areas where the total drainage area is less than 3 acres.

1.11.10 Temporary Sediment Basin

Temporary sediment basins may be constructed below disturbed areas where the total drainage area is equal to or greater than 3 acres.

1.11.11 Other Controls

Other controls such as diversion dikes, level spreaders, temporary seeding, etc. may be used if deemed necessary by the Contractor.

1.12 UTILITIES

The Contractor shall avoid running utilities underneath buildings, streets, and parking lots. In cases where it is necessary for the utilities to cross existing streets, the Contractor shall install the lines by boring and jacking methods. No open trenching will be allowed through existing streets unless written permission is obtained and approved by the Contracting Officer.

1.12.1 CATHODIC PROTECTION

Corrosion protection shall be provided for all buried gray or ductile-iron piping, coated piping, fittings, valves, and other water line appurtenances, regardless of pipe material. Corrosion protection shall consist of an anode type cathodic protection system. See Section 01 86 26 ELECTRICAL REQUIREMENTS.

1.12.2 Electrical Distribution System

See Section 01 86 26 ELECTRICAL REQUIREMENTS for instructions and engineering information relating to the design of the exterior electrical distribution system.

1.12.3 Exterior Communication

Refer to Section 01 86 29 COMMUNICATIONS REQUIREMENTS for exterior communications requirements.

1.13 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

1.13.1 Trenches

Jacking and boring shall be required when an underground utility line crosses any roadway. Sewer and water lines, mains or laterals, shall be placed in separate trenches. The separate trenches shall maintain a minimum horizontal separation of 10 feet and the bottom of the water line shall be at least 1.5 feet above the top of the sewer. Sewers crossing above potable water lines shall maintain a vertical separation of 1.5 feet and must be constructed of suitable pressure pipe or fully encased in concrete for a distance of 10 feet on each side of the crossing.

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Bedding and initial backfill material shall be in accordance with the manufacturers recommendations. Where no manufacturer's installation manual is available, trench walls shall be excavated to a stable angle of repose as required to properly complete the work. Trench excavations shall adhere to requirements prescribed in EM 385-1-1, Safety and Health Requirements Manual. Special attention shall be given to slopes which may be adversely affected by weather or moisture content.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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 - 3.2.4.5.2.3 Setup
 - 3.2.4.5.3 Sample Strategy
 - 3.2.4.5.4 Seasonal Tests
 - 3.2.4.5.4.1 Initial Functional Performance Tests
 - 3.2.4.5.4.2 Full-Load Conditions
 - 3.2.4.5.4.3 System Acceptance
 - 3.2.4.5.5 Aborted Tests and Re-Testing
 - 3.2.4.5.5.1 100 Percent Sample
- 3.2.5 Training Plan
- 3.2.6 Systems Manual
- 3.3 COMMISSIONING REPORT
- 3.4 POST-CONSTRUCTION SUPPORT
 - 3.4.1 Post-Construction Endurance Test

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SECTION 01 91 00.15 10

TOTAL BUILDING COMMISSIONING
05/19, CHG 3: 05/22

PART 1 GENERAL

1.1 SUMMARY

Commission the building systems listed herein. Employ the services of an independent Commissioning Firm. The Commissioning Firm must be a 1st tier subcontractor of the General or Prime Contractor and must be financially and corporately independent of all other subcontractors. The Commissioning Firm must employ a Lead Commissioning Specialist that coordinates all aspects of the commissioning process. Conform to the commissioning procedures outlined in this specification.

1.2 UNIFIED FACILITIES GUIDE SPECIFICATION REFERENCES

This specification section is intended to work in conjunction with the requirements included in the Unified Facilities Guide Specifications (UFGS) referenced within this specification section. Comply with the requirements of the referenced UFGS to the extent specified herein. UFGS can be found at on the Whole Building Design Guide website at:
<http://www.wbdg.org/>

1.3 SYSTEMS TO BE COMMISSIONED

Refer to specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS. Coordinate with Controls Venders (equipment manufacturer representatives), and provide support to the Cybersecurity Subject Matter Expert (SME) to ensure implementation of cybersecurity controls on all facility related control systems (frcs) to the maximum extent while ensuring all systems are fully functional as manufacturer and designer intent.

Coordinate commissioning and quality control activities for the following systems, equipment, and associated controls. System-specific requirements are located in the associated specification Sections. Commission the following systems, equipment, and associated controls in accordance with this section and the inspection, testing, and quality control requirements of their respective sections in addition to specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS:

- Heating, Ventilating, Air Conditioning, and Refrigeration Systems (HVAC)
- Building Automation System
- Utility Monitoring and Control System
- Lighting Systems
- Power Distribution Systems
- Power Generation Systems
- Service Water Heating Systems
- Plumbing Systems
- Natural Gas and Propane Systems
- Energy and Water Utility Metering Systems and Sub-Meters
- Facility Related Control Systems as defined in specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS, but not

listed here. Provide a coordinated review of the project requirements, and ensure that all frcs are commissioned and functional after implementation of cybersecurity controls.
Hot Aisle Containment Systems

1.4 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 HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 180 (2012) Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems

ASHRAE 202 (2018) Commissioning Process for Buildings and Systems

ASSOCIATED AIR BALANCE COUNCIL (AABC)

ACG Commissioning Guideline (2005) Commissioning Guideline

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

NEBB Commissioning Standard (2009) Procedural Standards for Whole Building Systems Commissioning of New Construction; 3rd Edition

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 014 (2013) HVAC Systems Commissioning Manual, 2nd Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 25-345-1 (2019) Commissioning -- Systems Manual

1.5 COMMUNICATION WITH THE GOVERNMENT

The Lead Commissioning Specialist (Cx) must submit all plans, schedules, reports, and documentation directly to the Contracting Officer Representative concurrent with submission to the CQC System Manager. The Lead Commissioning Specialist must have direct communication with the Contracting Officer's Representative regarding all elements of the commissioning process; however, the Government has no direct contract authority with the Lead Commissioning Specialist.

1.6 SEQUENCING AND SCHEDULING

1.6.1 Sequencing

Complete the following prior to starting Functional Performance Tests of mechanical systems:

- a. All equipment and systems have been completed, cleaned, flushed,

disinfected, calibrated, tested, and operate in accordance with contract documents and construction plans and specifications.

- b. Performance Verification Tests of the controls systems have been completed and the Performance Verification Test Report has been submitted and approved in accordance with UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.
- c. Testing, Adjusting, and Balancing has been completed and the Testing, Adjusting, and Balancing Report, has been submitted and approved in accordance with UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.
- d. The building envelope is enclosed according to contract documents with final construction completed.
- e. The Pre-Functional Checklists have been submitted and approved.
- f. The Certificate of Readiness for mechanical systems has been submitted and approved.

Complete the following prior to starting Functional Performance Tests of the electrical systems:

- a. All electrical, power generation, and lighting equipment and systems have been completed, calibrated, tested, and operate in accordance with contract documents and construction plans and specifications.
- b. The building envelope is enclosed according to contract documents with final construction completed.
- c. Ceiling tiles, floor coverings, and window coverings are in place.
- d. The Certificate of Readiness for electrical systems has been submitted and approved.
- e. Burn-in duration must be equal to the manufacturer's recommendations or, if there are no manufacturer's recommendation, burn-in duration must be as recommended by Illuminating Engineering Society (IES) standards, International Code Council (ICC) International Energy Conservation Code (IECC), ASHRAE or NFPA, whichever is more stringent. It is also acceptable if the aforementioned burn-in duration requirements have been completed by the manufacturer.

1.6.2 Project Schedule

Include the following tasks in the project schedule required by Section 01 32 01.00 10 PROJECT SCHEDULE. Ensure sufficient time is scheduled to accommodate the requirements of this specification section. The order of items listed below is not intended to imply a specified sequence:

- a. Submission and approval of the Commissioning Firm and Commissioning Specialist
- b. Submission and approval of the Testing, Adjusting, and Balancing (TAB) Firm and TAB Specialist specified in UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- c. Submission of the Design Review Report specified herein.

- d. Submission of the Design Review Report specified in UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.
- e. Submission and approval of the Construction Phase Commissioning Plan
- f. Installation of permanent utilities (gas, water, electric)
- g.
- h.
- i.
- j. Drainage and Vent, Building Sewers, Water Supply Systems and Backflow Prevention Assembly Tests specified in UFGS Section 22 00 00 PLUMBING, GENERAL PURPOSE
- k. Factory Acceptance Testing for each of the systems to be commissioned as required by technical specifications
- l. Manufacturer's Equipment Start-Up for each of the systems to be commissioned.
- m. Potable Water System Flushing specified in UFGS Section 22 00 00 PLUMBING, GENERAL PURPOSE
- n. Operational Tests of the plumbing system specified in UFGS Section 22 00 00 PLUMBING, GENERAL PURPOSE.
- p. Submission and approval of the TAB Schematic Drawings, Report Forms, and Procedures specified in UFGS Section 23 09 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.
- q. Submission and approval of Duct Air Leakage Test Procedures specified in UFGS Section 23 95 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- r. Duct Air Leakage Test Execution specified in UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- s. Submission and approval of the Final Duct Air Leakage Test Report specified in UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- t. Testing, Adjusting, and Balancing (TAB) Field Work required by UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- u. Submission and approval of the TAB Report specified in UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- v. TAB Field Acceptance Testing required by UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- w. Submission and approval of the Start-Up Testing Report specified in UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.
- x. Submission and approval of the Performance Verification Test Procedures specified in UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.
- y. Performance Verification Tests required by UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

- z. Performance Verification Test Report specified in UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC
- aa. Pre-Functional Checklist Submittal
- bb. Functional Performance Testing for each system to be commissioned
- cc. Integrated Systems Tests
- dd. Post-Test Deficiency Correction for each system to be commissioned
- ee. Re-Testing
- gg. Training for each of the systems to be commissioned
- hh. Systems Manual, submission and approval
- ii. Submission and approval of the Commissioning Report
- jj. Seasonal Testing
- kk. Post-Construction Endurance Testing
- ll. Post-Construction Site Visit

1.7 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

- Commissioning Firm; G
- Lead Commissioning Specialist; G
- Technical Commissioning Specialists; G
- Commissioning Firm's Contract; G

SD-05 Design Data

- Design Phase Commissioning Plan; G

SD-06 Test Reports

- Design Review Report; G
- Interim Construction Phase Commissioning Plan; G
- Final Construction Phase Commissioning Plan; G
- Pre-Functional Checklists; G

Issues Log

Commissioning Report; G

Post-Construction Trend Log Report; G

SD-07 Certificates

Certificate of Readiness; G

SD-10 Operation and Maintenance Data

Training Plan; G

Training Attendance Rosters; G

Systems Manual; G

Systems Manual G

SD-11 Closeout Submittals

Final Commissioning Report; S

Final Construction Phase Commissioning Plan; S

1.8 COMMISSIONING FIRM

Provide a Commissioning Firm that is certified in commissioning by one of the following: the AABC Commissioning Group (ACG); the National Environmental Balancing Bureau (NEBB); the International Certification Board/Testing, Adjusting, and Balancing Bureau (ICB/TABB), the Building Commissioning Association (BCA); the Association of Energy Engineers (AEE).

The Commissioning Firm must be certified in all systems to be commissioned to the extent such certifications are available from the certifying body. Describe any lapses in certification or disciplinary action taken by the certifying body against the proposed Commissioning Firm or Lead Commissioning Specialist in detail. Any firm or commissioning professional that has been the subject of disciplinary action by the certifying body within the five years preceding contract award is not eligible to perform any duties related to commissioning.

- a. Submit the Commissioning Firm's certification of qualifications including the name of the firm and certifications no later than 60 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.
- b. The Commissioning Firm's and Commissioning Specialists' certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the firm or a specialist loses a certification during this period, immediately notify the Contracting Officer's Representative and submit another Commissioning Firm or Commissioning Specialist for approval. All work specified in this specification section performed by the Commissioning Firm or associated Commissioning Specialists is invalid if the Commissioning Firm or Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.

- c. The Commissioning Firm must oversee and assist the General or Prime Contractor with the work specified herein. Submit the Commissioning Firm's Contract including the Scope of Work associated with the paragraph POST-CONSTRUCTION SUPPORT no later than 30 calendar days after approval of the Commissioning Firm. Submit one hard copy and an electronic copy.

1.8.1 Lead Commissioning Specialist

The Commissioning Firm must provide a Lead Commissioning Specialist (Cx) that has a minimum of five years of commissioning experience, including two projects of similar size and complexity, and that is one of the following: a NEBB qualified Systems Commissioning Administrator (SCA); ACG Certified Commissioning Authority (CCA); ICB/TABB Certified Commissioning Supervisor; BCA Certified Commissioning Professional (CCP); AEE Certified Building Commissioning Professional (CBCP); University of Wisconsin-Madison Qualified Commissioning Process Provider (QCxP); Building Commissioning Professional (BCxP).

- a. Submit the Lead Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 30 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.
- b. The Lead Commissioning Specialists certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the specialist loses a certification during this period, immediately notify the Contracting Officer's Representative and submit another Lead Commissioning Specialist for approval. All work specified in this specification section to be performed by the Lead Commissioning Specialist is invalid if the Lead Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.
- c. The Lead Commissioning Specialist must lead and oversee the commissioning work specified herein and be the primary point of contact for the Government regarding the commissioning work. One of the Technical Commissioning Specialists may be the Lead Commissioning Specialist provided that all of the qualification requirements are met.

1.8.2 Technical Commissioning Specialists

Technical Commissioning Specialists, employed by the Commissioning Firm and that have the following qualifications, must perform the technical work specified herein associated with each system to be commissioned:

- a. Mechanical Technical Commissioning Specialist: The technical work associated with mechanical systems including Heating, Ventilating, Air Conditioning, and Refrigeration Systems; Building Automation System; Utility Monitoring and Control System; Service Water Heating Systems; Plumbing Systems; Energy and Water Utility Metering Systems must be performed by a Commissioning Specialist certified by NEBB, ACG, ICB/TABB, or BCA in the commissioning of HVAC systems with five years of experience in the commissioning of HVAC systems.
- b. Electrical Technical Commissioning Specialist: The technical work associated with electrical systems including Lighting Systems; Power

Distribution Systems; Power Generation Systems; Electrical Utility Metering Systems must follow Section 26 08 00 Apparatus Inspection and Testing when NETA testing is required. Add the following sentence to the specifier notes preceding this paragraph: When NETA testing is not required, determine the qualifications for the Electrical Technical Commissioning Specialist.

- c. Cybersecurity Subject Matter Expert (SME): Refer to requirements in specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS.
- d. Submit the Technical Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 30 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.

1.8.3 Commissioning Standard

Comply with the requirements of the commissioning standard under which the Commissioning Firm and Specialists qualifications are approved. When the firm and specialists are certified by BCA, AEE, ASHRAE, or the University of Wisconsin-Madison, comply with the requirements of one of the acceptable standards unless otherwise stated herein. The acceptable standards are ACG Commissioning Guideline, NEBB Commissioning Standard, ANSI/SMACNA 014, or ASHRAE 202. Comply with applicable NETA testing standards for electrical systems.

- a. Implement all recommendations and suggested practices contained in the Commissioning Standard and electrical test standards.
- b. Use the Commissioning Standard for all aspects of Commissioning, including calibration of instruments.
- c. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the Commissioning Standard, adhere to the manufacturer calibration recommendations.
- d. All quality assurance provisions of the Commissioning Standard such as performance guarantees are part of this contract.
- e. The Commissioning Specialists must develop commissioning procedures for any systems or system components not covered in the Commissioning Standard.
- f. Use any new requirements, recommendations, and procedures published or adopted prior to contract solicitation by the body responsible for the Commissioning Standard.

1.9 SUSTAINABILITY THIRD PARTY CERTIFICATION (TPC)

The Commissioning Specialists must execute and document the commissioning activities required of the Commissioning Authority for the purposes of complying with the Third Party Certification (TPC) requirements for the project in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING. Provide all commissioning documentation required to meet the TPC requirements.

1.10 ISSUES LOG

The Lead Commissioning Specialist must develop and maintain an Issues Log for tracking and resolution of all deficiencies discovered through submittal reviews, inspection, and testing. Include the date of final resolution of issues as confirmed by the Commissioning Specialist. Submit the Issues Log on a monthly basis at a minimum. At any point during construction, any commissioning team member finding deficiencies may communicate those deficiencies in writing to the Commissioning Specialist for inclusion into the Issues Log.

Track construction deficiencies identified in the Issues Log using QCS as specified in Specification Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE(RMS CM).

1.11 CERTIFICATE OF READINESS

Prior to scheduling Functional Performance Tests for each system, issue a Certificate of Readiness for the system certifying that the system is ready for Functional Performance Testing. The Certificate of Readiness must include, for each system to be commissioned, all equipment and system start-up reports; Performance Verification Test Reports; completed Pre-Functional Checklists; Testing, Adjusting, and Balancing (TAB) Report; HVAC Controls Start-Up Reports; and the Air Leakage Test Reports and Diagnostic Test Reports to the extent applicable to the system. The Contractor; the Lead Commissioning Specialist; the Contractor's Quality Control Representative; the Mechanical, Electrical, Controls, and TAB subcontractor representatives must sign and date the Certificate of Readiness. Submit the Certificate of Readiness for each system no later than 14 calendar days prior to Functional Performance Tests of that system. Submit one hard copy and an electronic copy. Do not schedule Functional Performance Tests for a system until the Certificate of Readiness for that system receives approval by the Government.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 DESIGN PHASE

3.1.1 Design Commissioning Coordination Meeting

The Lead Commissioning Specialist (Cx/C) must lead a meeting prior to the interim design submittal for any system required to be commissioned to discuss the commissioning process including project contract requirements, lines of communication, roles and responsibilities, schedules, and documentation requirements. The Contractor's Superintendent or Project Manager, the Contractor's Quality Control Representative, the Designers of Record for the commissioned systems, and the Government must attend this meeting. The User and a Base Civil Engineer Office Representative may attend this meeting.

3.1.2 Design Phase Commissioning Plan

The Lead Commissioning Specialist (Cx/C) must prepare the Design Phase Commissioning Plan. Submit the Design Phase Commissioning Plan no later than 14 calendar days after approval of the Commissioning Specialists.

Submit one hard copy and an electronic copy.

Outline the commissioning process, commissioning team members and responsibilities, lines of communication, and documentation requirements for the design phase of the project in the Design Phase Commissioning Plan. Identify the Commissioning Standard chosen for the project.

3.1.3 Design Review

The Lead Commissioning Specialist and Technical Commissioning Specialists must review the design-build construction contract (information relevant to the systems to be commissioned, such as Mechanical, electrical, plumbing), Design Plans and Specifications, the Basis of Design, and the Owner's Project Requirements Document BOD (Basis of Design) prior to 60 percent completion of the design. The Owner's Project Requirements Document BOD (Basis of Design) is attached as Appendix A. The Owner's Project Requirements Document BOD (Basis of Design) is not contract requirements and is provided for commissioning review purposes only. The Commissioning Specialists must assess the completeness and clarity of the Owner's Project Requirements, verify that the requirements stated in the design-build construction contract and the Owner's Project Requirements are addressed in the Basis of Design, and verify that the Design Plans and Specifications are prepared in accordance with the Basis of Design, the design-build construction contract, the Unified Facilities Criteria (UFC) referenced by the design-build construction contract, and the Owner's Project Requirements. The Commissioning Specialists must also identify any deficiencies that would prevent the building systems from operating or performing effectively. The Commissioning Specialists must backcheck their comments at all subsequent design documentation submissions.

The Commissioning Specialists must provide a Design Review Report for each submittal identifying any discrepancies between the reviewed documents or deficiencies that would prevent the building systems and features from operating or performing effectively in accordance with the design-build construction contract and Owner's Project Requirements Document and from being adequately maintainable. Individually list each deficiency and the corresponding proposed corrective action necessary for proper system performance in the Design Review Report. Submit one hard copy and an electronic copy of the report with the corrected final design submission. The Contracting Officer's Representative, the Lead Commissioning Specialist, and the Designers of Record for the associated systems must meet, discuss, and resolve any outstanding items contained in the report no later than 14 calendar days after submission of the report.

3.2 CONSTRUCTION PHASE

3.2.1 Construction Commissioning Coordination Meeting

The Lead Commissioning Specialist must lead a Construction Commissioning Coordination Meeting no later than 30 days following construction notice to proceed to discuss the commissioning process including contract requirements, lines of communication, roles and responsibilities, schedules, documentation requirements, inspection and test procedures, and logistics as specified in this specification section. The Contractor's Superintendent or Project Manager, the Contractor's Quality Control Representative, and the Government must attend this meeting. Invite the

User and a Base Civil Engineer Office Representative to attend this meeting.

3.2.2 Construction Phase Commissioning Plan

3.2.2.1 Interim Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Interim Construction Phase Commissioning Plan. Submit the Interim Construction Phase Commissioning Plan no later than 30 calendar days after the Construction Commissioning Coordination Meeting and no later than 14 days prior to the start of construction of the building envelope. Submit one hard copy and an electronic copy.

Identify the commissioning and testing standards and outline the overall commissioning process, the commissioning schedule, the commissioning team members and responsibilities, lines of communication, documentation requirements for the construction phase of the project in the Interim Construction Phase Commissioning Plan.

3.2.2.1.1 Checklists

Download example Pre-Functional Checklists, Integrated Systems Test Checklists, and Functional Performance Test Checklists for specification section 01 91 00.15 10 TOTAL BUILDING COMMISSIONING at the following location:

<http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphic>

The checklists submitted in the Interim and Final Construction Phase Commissioning Plans must contain the same level of detail shown in the examples. The submitted checklists are not required to match the format of the examples.

3.2.2.2 Final Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Final Construction Phase Commissioning Plan. Submit the Final Construction Phase Commissioning Plan no later than 30 calendar days prior to the start of Pre-Functional Checks. Submit one hard copy and an electronic copy. Once approved, file the approved plan in the Sustainability eNotebook.

Include the information provided in the Interim Construction Phase Commissioning Plan. In addition, the Technical Commissioning Specialist must develop the Pre-Functional Checklists, Integrated Systems Test Checklists, and Functional Performance Test Checklists for each building, for each system required to be commissioned, and for each component for inclusion in the Final Construction Phase Commissioning Plan.

3.2.2.2.1 Pre-Functional Checklists

The Pre-Functional Checklists must include items for physical inspection or testing that demonstrate that installation and start-up of equipment and systems is complete. Refer to paragraph Pre-Functional Checks for more information.

3.2.2.2.2 Functional Performance Test Checklists

Functional Performance Test Checklists must include procedures that explain, step-by-step, the actions and expected results that will

demonstrate that the system performs in accordance with the contract. Refer to paragraph Functional Performance and Integrated Systems Tests for more information. Include the following sections and details appropriate to the systems being tested in the Functional Performance Test Checklists:

- a. Notable system features including information about controls to facilitate understanding of system operation
- b. Conclusions and recommendations. Conclusions must clearly indicate if system does or does not perform in accordance with contract requirements. Recommendation must clearly indicate that the system should or should not be accepted by the Government.
- c. Test conditions including date, beginning and ending time, and beginning and ending outdoor air conditions
- d. Attendees
- e. Identification of the equipment involved in the test
- f. Control system feature identification
- g. Point-to-point observations including demonstrating system flow meters and sensors have been calibrated and are correctly displayed on the Operator work station
- h. Actuator operation observations demonstrating actuator responses to commands from the control system
- i. As-found condition of the system operation
- j. List of test items with step numbers along with the corresponding feature or control operation, intended test procedure, expected system response, and pass/fail indication.
- k. Space for comments for each test item.

3.2.2.2.3 Integrated Systems Test Checklists

Integrated Systems Test Checklists must include test procedures that explain, step-by-step, the actions and expected results that will demonstrate that the interactive operations between systems performs in accordance with the contract. Refer to paragraph Functional Performance and Integrated Systems Tests for more information. Include the following sections in the Integrated Systems Test Checklists:

- a. Notable features of the interconnected systems organized by discipline including information to facilitate understanding of system operation
- b. Conclusions and recommendations. Conclusions must clearly indicate if the systems do or do not perform in accordance with contract requirements. Recommendation must clearly indicate that the systems should or should not be accepted by the Government
- c. Test conditions including date and beginning and ending time
- d. Attendees
- e. Identification of the equipment and systems involved in the test

- f. List of test items with step numbers along with the corresponding feature or control operation, intended test procedure, expected system response, and pass/fail indication.
- g. Space for comments for each test item.

3.2.3 Construction Submittals

Provide all submittals associated with the systems to be commissioned, including shop drawings; equipment submittals; test plans, procedures, and reports; and resubmittal's to the Commissioning Specialists. The Technical Commissioning Specialist must review the submittals to the extent necessary verify that the equipment and system installation will comply with the contract requirements, the Unified Facilities Criteria (UFC) referenced by the design-build contract, and the requirements of the Basis of Design and the Owner's Project Requirements Document.

3.2.4 Inspection and Testing

Demonstrate that all system components have been installed, that each control device and item of equipment operates, and that the systems operate and perform, including interactive operation between systems, in accordance with contract documents and the Owner's Project Requirements. Requirements in related specification sections are independent from the requirements of this section and do not satisfy any of the requirements specified in this specification section. Provide all materials, services, and labor required to perform the Pre-Functional Checks, Integrated Systems Tests, and Functional Performance Tests.

3.2.4.1 Commissioning Team

Provide a commissioning representative for each sub-contractor associated with the systems to be commissioned. Each commissioning representative is responsible for coordination of their respective sub-contractor's execution of the commissioning activities and participation in the inspection and testing required by this specification section. The designers listed below are the designers of record for their respective systems. Substitutes must be approved by the Contracting Officer's Representative.

3.2.4.1.1 Mechanical System Pre-Functional Checks Team

The following team members must participate in Pre-Functional checks of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative

Designation	Function
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative
PC	Contractor's Plumbing Commissioning Representative
IC	Contractor's Irrigation Commissioning Representative

3.2.4.1.2 Electrical System Pre-Functional Checks Team

The following team members must participate in Pre-Functional checks of electrical systems:

Designation	Function
CxE	Electrical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
EC	Contractor's Electrical Commissioning Representative

3.2.4.1.3 Mechanical Systems Test Team

The following team members must participate in Functional Performance and Integrated Systems Testing of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative
PC	Contractor's Plumbing Commissioning Representative
IC	Contractor's Irrigation Commissioning Representative

Designation	Function

3.2.4.1.4 Electrical Systems Test Team

The following team members must participate in Functional Performance and Integrated Systems Testing of electrical systems:

Designation	Function
CxE	Electrical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
EC	Contractor's Electrical Commissioning Representative

3.2.4.1.5 Other Pre-Functional and Functional Performance Participants

The following may participate as team members during Pre-Functional Checks and Functional Performance Testing:

Designation	Function
BCE	Base Civil Engineer Office Representative
User	Using Agent's Representative

3.2.4.2 Pre-Functional Checks

Pre-Functional Checklists from the approved Final Construction Phase Commissioning Plan must be completed by the commissioning team. Complete one Pre-Functional Checklist for each individual item of equipment or system for each system required to be commissioned including, but not limited to, ductwork, piping, equipment, fixtures (lighting and plumbing), and controls. Indicate commissioning team member inspection and acceptance of each Pre-Functional Checklist item by initials. Acceptance

of each Pre-Functional Checklist item by each team member indicates that item conforms to the construction contract and accepted design requirements in their area of responsibility. Technical Commissioning Specialist acceptance of each Pre-Functional Checklist item indicates that each item has been installed correctly and in accordance with contract documents and the Owner's Project Requirements. Submit the completed and initialed Pre-Functional Checklists no later than 7 calendar days after completion of inspection of all checklists items for each system. Submit one hard copy and an electronic copy. Include manufacturer start-up checklists associated with equipment with the submission of the Pre-Functional Checklists.

3.2.4.3 Testing, Adjusting, and Balancing (TAB) Report and Field Acceptance Testing

The Mechanical System Technical Commissioning Specialist must review the pre-final TAB Report required by UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC. Identify any deficiencies to the Contracting Officer's Representative and the Contractor's Quality Control Personnel. Resolve all deficiencies prior to TAB Field Acceptance Testing.

The Mechanical System Technical Commissioning Specialist must witness the TAB Field Acceptance Testing specified by UFGS Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC. Include a certification by the Mechanical Technical Specialist that no outstanding deficiencies exist in the systems relative to Testing, Adjusting, and Balancing with the final TAB Report submittal.

3.2.4.4 HVAC Controls Test Reports

The Mechanical System Technical Commissioning Specialist must review the Start-Up Testing Report and the PVT Procedures and Reports required by UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC and UFGS Section 25 10 10 UTILITY MONITORING AND CONTROL SYSTEM (UMCS) Front End and Integration. Include a certification by the Mechanical System Technical Commissioning Specialist that the submittals contain no deficiencies or that the submittals do not indicate any deficiencies in the HVAC systems or HVAC control systems with each of these submittals.

3.2.4.5 Tests

3.2.4.5.1 Functional Performance and Integrated Systems Tests

Schedule Functional Performance Tests for each system only after the Certificate of Readiness has been approved by the Government for the system. Correct all deficiencies identified through any prior review, inspection, or test activity before the start of Functional Performance Tests. Perform Integrated Systems Tests only after the Functional Performance Tests for each associated system are completed with all deficiencies resolved and after the related Functional Performance Test Checklists have been signed by each commissioning team member.

- a. Functional Performance Tests and Integrated Systems Tests must be performed with the Contracting Officer's Quality Assurance Representative present.
- b. Abort Functional Performance Tests or Integrated Systems Tests when any system deficiency prevents the successful completion of the test.

- c. Technical Commissioning Specialists must lead and document all Functional Performance Tests and Integrated Systems Tests for the systems to be commissioned with the Contractor and appropriate sub-contractors performing the Functional Performance Tests and Integrated Systems Tests. The representatives listed in the paragraph Commissioning Team must attend the tests. Abort Functional Performance Tests or Integrated Systems Tests when any required commissioning team member is not present for the test.

3.2.4.5.1.1 Checklist

Use the Functional Performance Test and Integrated Systems Test Checklists from the approved Final Construction Phase Commissioning Plan to guide the Functional Performance Tests and Integrated Systems Tests. Functional Performance Tests must be performed for each item of equipment and each system required to be commissioned and verify all sensor calibrations, control responses, safeties, interlocks, operating modes, sequences of operation, capacities, lighting levels, and all other performance requirements comply with construction contract and accepted design requirements regardless of the specific items listed within the Functional Performance Test and Integrated Systems Test Checklists provided. Testing must progress from equipment or components to subsystems to systems to interlocks and connections between systems. Integrated Systems Tests must be performed for the interactive operation between systems such as HVAC systems, fire protection systems, back-up electrical supply, energy generation systems, and other systems, and verify correct interactive operation, acceptable speed of response, and other contract requirements for both normal and failure modes. Examples of Integrated Systems Tests include the correct operation of HVAC systems during emergency system activation, correct operation of uninterruptible power supplies or energy generators and connected systems, or lighting system operation during power outage or emergency system activation. The order of components and systems to be tested must be determined by the Technical Commissioning Specialists.

3.2.4.5.1.2 Equipment and Systems Deficiencies Check

Indicate acceptance of each item of equipment and systems tested by signature of each commissioning team member for each Functional Performance Test or Integrated Systems Test Checklist. The Contractor's Quality Control Representative and the Technical Commissioning Specialists must indicate by initials that the equipment and systems are free of deficiencies.

3.2.4.5.2 HVAC Test Methods

Perform Functional Performance Tests in accordance with the following:

3.2.4.5.2.1 Prior to Testing

Prior to testing operating modes, sequences of operation, interlocks, and safeties, complete control point-to-point observations, test sensor calibrations, and test actuator commands.

3.2.4.5.2.2 Simulating Conditions

Over-writing control input values through the controls system is not acceptable, unless approved by the Contracting Officer's Representative. Identify proposed exceptions in a protocol submitted to the Contracting

Officer's Representative for approval. Before simulating conditions, overwriting values (if approved), or changing set-points, calibrate all sensors, transducers and devices. Below are several examples of exceptions that would be considered acceptable:

- a. When varying static pressures inside ductwork can not be simulated within the duct, and where a sensor signals the controls system to initiate sequences at various duct static pressures, it is acceptable to simulate the various pressures with a Pneumatic Squeeze-Bulb Type Signaling Device with gauge temporarily attached to the sensing tube leading to the transmitter. It is not acceptable to reset the various set-points, nor to simulate an electric analog signal (unless approved as noted above).
- b. Dirty filter pressure drops can be simulated using sheets of cardboard at filter face.
- c. Freeze-stat safeties can be simulated by packing portion of sensor with ice.
- d. High outside air temperatures can be simulated with a hair blower.
- e. High entering cooling coil temperatures can be used to simulate entering cooling coil conditions.
- f. Do not use signal generators to simulate sensor signals unless approved by the Contracting Officer's Representative, as noted above, for special cases.
- g. Control set points can be altered. For example, to see the air conditioning compressor lockout work at an outside air temperature below 55 degrees F, when the outside air temperature is above 55 degrees F, temporarily change the lockout set point to be 0 degrees F above the current outside air temperature. Caution: Set points are not to be raised or lowered to a point such that damage to the components, systems, or the building structure and/or contents will occur.
- h. Test duct mounted smoke detectors in accordance with the manufacturer's recommendations. Perform the tests with air system at minimum airflow condition in ductwork.
- i. Test current sensing relays used for fan and pump status signals to control system to indicate unit failure and run status by resetting the set point on the relay to simulate a lost belt or unit failure while the unit is running. Confirm that the failure alarm was generated and received at the control system. After the test is conducted, return the set point to its original set-point or a set-point as indicated by the Contracting Officer's Representative.

3.2.4.5.2.3 Setup

Perform each test under conditions that simulate actual conditions as close as is practically possible. Provide all necessary materials and system modifications to produce the necessary flows, pressures, temperatures, and other conditions necessary to execute the test according to the specified conditions. At completion of the test, return the affected building equipment and systems to their pre-test condition.

3.2.4.5.3 Sample Strategy

Perform Functional Performance Tests and Integrated Systems Tests for all equipment and systems. Prepare and complete a Functional Performance Test Checklist for each item of equipment or system. Prepare and complete an Integrated Systems Test Checklist for each item of equipment or system.

3.2.4.5.4 Seasonal Tests

3.2.4.5.4.1 Initial Functional Performance Tests

Perform Initial Functional Performance Tests as soon as all contract work is completed, regardless of the season. Develop and implement means of artificial loading to demonstrate, to a reasonable level of confidence, the ability of the HVAC systems to handle peak seasonal loads.

3.2.4.5.4.2 Full-Load Conditions

In addition to the Initial Functional Performance Tests, perform Functional Performance Tests of HVAC systems under full-load conditions during peak heating and cooling seasons during outdoor air condition design extremes.

Schedule Seasonal Functional Performance Tests in coordination with the Government.

3.2.4.5.4.3 System Acceptance

Systems may be partially accepted by the Government prior to seasonal testing if they comply with all construction contract and accepted design requirements that can be tested during initial Functional Performance Tests. All Functional Performance Test procedures must be completed prior to full systems acceptance.

3.2.4.5.5 Aborted Tests and Re-Testing

Abort Functional Performance Tests, Integrated Systems Tests, or Seasonal Tests if any deficiency prevents successful completion of the test or if any required commissioning team member is not present for the test. Reimburse the Government for all costs associated with effort lost due to re-testing due to test failures and aborted tests. These costs must include salary, travel costs, and per diem for Government commissioning team members. Re-test only after all deficiencies identified during the original tests have been corrected.

3.2.4.5.5.1 100 Percent Sample

Systems or equipment for which 100 percent sample size are tested fail if one or more of the test procedures results in discovery of a deficiency and the deficiency cannot be resolved within 5 minutes during the test.

Re-test to the extent necessary to confirm that the deficiencies have been corrected without negatively impacting the performance of the rest of the system.

3.2.5 Training Plan

Develop a training plan which identifies all training required by specification sections associated with commissioned systems. Include a matrix listing each training requirement, content of the training, the trainer name, trainer contact information, and schedule and location of training. Submit one hard copy and an electronic copy of the Training Plan to the Commissioning Specialists and the Government no later than 30 calendar days prior to the associated training.

Document training attendance using training attendance rosters and provide completed attendance rosters to the Commissioning Specialists and the Government no later than 7 calendar days following the completion of training for each system to be commissioned. Submit one hard copy and an electronic copy..

3.2.6 Systems Manual

Prepare and submit a Systems Manual including a signed certification or letter from the Technical Commissioning Specialists and the Lead Commissioning Specialist stating that the Systems Manual is complete, clear, and accurate. The Systems Manual, for all commissioned systems, must conform to Appendix A SYSTEMS MANUAL ORGANIZATION AND CONTENT to ER 25-345-1, available at the USACE Publications website at the following location:

<https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations/>. Update and resubmit the Systems Manual based on any corrective action taken during the warranty period.

Submit Systems Manual no later than 30 calendar days following completion of Functional Performance Tests and Integrated Systems Tests. Submit three hard copies and an electronic copy.

3.3 COMMISSIONING REPORT

Following the completion of Functional Performance Tests and Integrated Systems Tests, with the exception of Seasonal Tests, the Lead Commissioning Specialist must prepare a Commissioning Report.

- a. Include an executive summary describing the overall commissioning process, the results of the commissioning process, any outstanding deficiencies and recommended resolutions, and any seasonal testing that must be scheduled for a later date. Indicate, in the executive summary, whether the systems meet the requirements of the construction contract and accepted design and the Owner's Project Requirements.
- b. Detail any deficiencies discovered during the commissioning process and the corrective actions taken in the report. Include the completed Pre-Functional Checklists, Functional Performance Test Checklists, Integrated Systems Test Checklists, the Commissioning Plans, the Issues Log, Performance Verification Test Reports, Training Attendance Rosters, the Design Review Report, the final TAB Report.
- c. Submit the Commissioning Report no later than 14 calendar days following commissioning team acceptance of all Functional Performance Tests and Integrated Systems Tests with the exception of Seasonal Tests. Submit three hard copies and an electronic copy.
- d. Following any Seasonal Tests or Post-Construction Activities, update

the Final Commissioning Report to reflect any changes and resubmit. File the approved, updated, Final Commissioning Report in the Sustainability eNotebook.

3.4 POST-CONSTRUCTION SUPPORT

3.4.1 Post-Construction Endurance Test

Perform an Endurance Test in accordance with the paragraph Endurance Test in UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC once during the peak heating season and once during the peak cooling season during outdoor air condition extremes with the exception that network bandwidth usage measurement and recording is not required. Use the Temporary Trending Hardware, if necessary, in accordance with UFGS Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

The Mechanical System Commissioning Specialists must review the trend logs from the Endurance Tests to ensure that the systems have stable operation and operate as required by the construction contract, the accepted design, and the Owner's Project Requirements Document. The Commissioning Specialists must provide a Post-Construction Trend Log Report that identifies any deficiencies noted in operation, recommendations for correction, and includes a graphical representation of the trends. Provide one Trend Log Report for the peak cooling season and one Trend Log Report for the peak heating season. Submit one hard copy and one electronic copy of the Post-Construction Trend Log Reports no later than 14 calendar days following receipt of the trend log data by the Commissioning Specialist.

-- End of Section --

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX A ROOM DATA SHEETS



**US Army Corps
of Engineers ®**
Omaha District

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ROOM NAME: 099 - Communications Hut

- A. Function:** Provides communications distribution point for all DRP buildings for this project and future construction
- B. Quantity:** 1
- C. Adjacencies:** N/A
- D. Minimum/Maximum Area:** As shown, yard to be sized for equipment and necessary working clearances
- E. Number of Occupants:** Not applicable
- F. Architectural:**
- Comm hut with the following features:
 - Exterior insulated walls; colors to match Grand Forks AFB colors.
 - Pitched, metal, insulated roof with 4:12 slope minimum, gutters and downspouts, and snow guards at doors and walkways
 - Provide covered entry at personnel doors
 - Doors: 72" x 84", steel, insulated, double door with full length astragal
 - Provide concrete pit for pulling in communication lines. Minimum size to be 12' x 16' x 8'H
 - Provide access hatch, ladder and guard rail for the pit
 - Floor to be sealed concrete.
 - Mechanical yard
 - Provide mechanical yard for any exterior equipment.
 - Wall to match material of the comm hut
 - Roof shall be continuous from the comm hut and of the same material
 - Provide louvers as required for air flow to the equipment
 - Equipment yard doors: 36" x 84" steel door and 10' x 8' overhead or coiling door
 - Floor to be concrete with broomed finish
- G. Interiors:**
- Walls: Paint or prefinished metal
 - Ceilings: Open to structure
- H. Electrical/Communications:**
- Comm: 5 full size 4-post racks/cabinets, horizontal and vertical cable management, ladder racking, and bonding/grounding system. Two 4-inch conduits with 3 cell mesh innerduct installed and routed to hand hole HH62. 12 strand SM fiber installed and routed to the 319 CS node located in Building 607. 96 strand SM fiber installed and routed the service entrance for B631. All work shall be done in accordance with UFC-3-580-01, TIA-568, TIA-607, TIA-758, NFPA 70 and UFC 3-520-01.
 - UPS Power: No
 - Lighting: Suspended pendant mounted linear luminaire; manual on, manual off.
 - Power: Provide double duplex receptacle with a dedicated circuit for each of the 5 communication racks.

I. HVAC/Plumbing/Fire:

HVAC: Provide packaged systems to provide space heating and cooling. Systems to be located in equipment yard and ducted into space. For redundancy, two systems each sized for peak loads will be provided.

- Fire Protection:
 - Sprinklers not required
 - Provide smoke detection and fire alarm

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** NA
- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** Racks, battery rack, UPS

ROOM NAME: 101 - Transition/Landing Zone

- A. Function:** Used by people waiting clearance for the building, check email, and perform unclassified work.
- B. Adjacencies:** 1st Floor near front entry, Heritage Room, unclassified restrooms
- C. Quantity:** 1
- D. Number of Occupants:** 15
- E. Minimum/Maximum Area:** As shown+/-
- F. Architectural:**
- Ceiling height: 10'
 - Provide half-height wall on corridor side for electrical to task stations.
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Non-secure voice and data outlets as required. 10 workstations – NIPR data only (CAT 6 UTP), located at each workstation/printer station. Voice (CAT 6 UTP) dropped at "center" workstation" Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls and at every workstation.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 102 - Heritage Room

- A. Function:** Large room in non-secured space for squadron functions, hail and farewell ceremonies, informal meetings, promotion ceremonies, etc. that also serves as a breakroom.
- B. Adjacencies:** People in the Transition/Landing Zone can also use the Heritage Room when not being used by the unit.
- C. Quantity:** 1
- D. Number of Occupants:** 100 +/-
- E. Minimum/Maximum Area:** As fits space shown
- F. Architectural:**
- Ceiling height: 10' Min.; maximize ceiling height
 - Provide U-shaped countertops with base cabinets below. Linear length of cabinets to be approx.. 40'. Provide 42" high x 18" deep bar countertop on side that is not enclosed by a wall.
 - Building will not have vending machines. The unit will purchase snacks in bulk and have area available for purchase by individuals. Provide countertop space for snack purchases. Provide and lockable storage underneath for storage of bulk snack supplies.
 - Door to the exterior shall be fully glazed, storefront. Door hardware shall include panic hardware, exterior pull, and keyed lock.
 - Provide concrete patio off of exterior door. See Section 01 89 00 and Concept Drawings
- G. Interiors:**
- Floors: Porcelain Tile
 - Walls: Paint, Accent Tile Backsplash
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Non-secure voice and data outlets at work stations as required. NIPR data only. Refer to Ground to Facility ICD – Annex B.
 - CATV at TV displays
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity. Provide decorative pendant lighting at 42" raised countertops.
 - Provide for dimmable lighting and ability for "scene" set up for presentations
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide duplex receptacles spaced min. every 3 feet along countertops. Provide surface mounted raceway on countertop for electrical outlets that abut the secured boundary wall.
 - Dedicated circuits for maker, microwaves, dishwasher, and refrigerators
- I. HVAC/Plumbing/Fire:**
- Plumbing: Sink with disposal, dishwasher, water line to refrigerators and ice maker
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs

- **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 102A - Recycling Room

- A. Function:** Area for collecting recyclables for the entire building
- B. Adjacencies:** Heritage Room
- C. Quantity:** 1
- D. Number of Occupants:** NA
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 8' Min
 - Door with latch
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: NA
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls
- I. HVAC/Plumbing/Fire:**
- Standard
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): Recycling bins

ROOM NAME: 103 - Nursing Mother's Room

- A. Function:** Room for nursing mothers
- B. Adjacencies:** 1st Floor
- C. Quantity:** 1
- D. Number of Occupants:** 1
- E. Minimum/Maximum Area:** 50-100 s.f.
- F. Architectural:**
- Comply with UFC 1-200-01 para. 1-4.2
 - Counter across entire length of one wall with space for undercounter refrigerator/freezer.
 - Ceiling height: 8' min.
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: N/A
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls with a minimum of one per wall. General convenience receptacles above counter. Comply with UFC 1-200-01 para. 1-4.2
- I. HVAC/Plumbing/Fire:**
- Plumbing: Sink
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 104 - Lockers

- A. Function:** Area for personnel and students to secure backpacks, purses, coats and personal belongings that cannot go into the secured area
- B. Quantity:** 1
- C. Adjacencies:** Locate near the Drop/Landing Zone.
- D. Minimum/Maximum Area:** As required for efficient layout
- E. Number of Occupants:** Not regularly occupied
- F. Architectural:**
- Non-secured area
 - Provide 64-66 lockable lockers. Lockers are to be two per unit for a total of 32-33 units.
 - Provide a cell phone locker with 35 lockable spaces.
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Porcelain Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- NIPR/Voice/SIPR: N/A
 - Lighting: Per UFC 3-530-01 for locker rooms.
 - Power: Provide GFCI duplex receptacles located every 25 feet along walls without lockers. Provide at least one GFCI duplex receptacle for this space.
- I. HVAC/Plumbing/Fire:**
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): NA

ROOM NAME: 105 & 203 Secure Communications Room

- A. Function:** Location for secured communication racks and equipment; secured comm lines are distributed from here to the rest of the building, including the Communications Room.
- B. Quantity:** 2; 1 large comm closet on first floor and 1 small access closet on second floor
- C. Adjacencies:** Central to the building to minimize excessive lengths of communication lines; stacking of the closets is preferred
- D. Minimum/Maximum Area:** As required to fit comm racks
- E. Number of Occupants:** NA
- F. Architectural:**
- Walls, Ceiling: 1-hr fire rated boundary walls and ceiling to Mission Assurance Category II requirements per Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)
 - Doors: Provide card read with PIN
- G. Interiors:**
- Floors: Static Dissipative Vinyl Tile
 - Walls: Paint
 - Ceilings: Exposed structure or provide 1-hr rated lid per TSFPEWG G 3-600-01.01-18
- H. Electrical/Communications:**
- Comm: Refer to Ground to Facility ICD – Annex B for rack/cabinet layout/provisioning.
 - Racks/cabinets for secure data distribution as applicable w/ ICD-705-compliant routing support for both backbone and plenum cable distribution. See Ground to Facility ICD—Annex B for additional information.
 - ICD-705-compliant Interconnect Conduits to other Comm Rooms, I.D. = 4", minimum bend radius = 7".
 - UPS Power: Yes. Everything in this area shall be powered by the Communication Server Room UPS system.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Emergency power cutoff switch near room entrance, labeled and protected from accidental engagement. Lightning/surge suppression on all circuits. Each PDU shall have one dedicated UPS circuit to each UPS system A and B.
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity. All light fixtures in this area shall provide emergency lighting.
- I. HVAC/Plumbing/Fire:**
- Provide heating/cooling to maintain room temperature of 65-80 deg F. Base HVAC capacity on anticipated electrical equipment loads.
 - Room must comply with Mission Assurance Category II requirements as identified in Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** Communications racks, patch panels, cabling, etc.

- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** NA

ROOM NAME: 106 and 115 - SIM (OA) Servers

- A. Function:** Operations Area (OA): Provides communications servers for the entire OA it serves
- B. Quantity:** 2 (1 per OA)
- C. Adjacencies:** SIM Rooms
- D. Minimum/Maximum Area:** 800 s.f. min.
- E. Number of Occupants:** Not applicable
- F. Architectural:**
- 15' x 49.5' (minimum hard dimensional requirements)
 - Floor: 18" high RAF
 - Walls:
 - Exterior ICS/ICD 705 boundary walls
 - Interior STC 50 walls (structural floor to structural ceiling) to mitigate sound from servers into SIM rooms
 - 2-hr fire rated boundary walls Mission Assurance Category I requirements. Room is categorized as MAC II, but walls will be constructed to MAC I requirements.
 - Ceiling:
 - 10' AFF min.
 - 2-hr fire rated as required for Mission Assurance Category I requirements. Room is categorized as MAC II, but ceiling will be constructed to MAC I.
 - Doors:
 - 72" x 84" double door at exterior. Provide concrete, exterior ramp to accommodate RAF and to connect to existing sidewalk or asphalt to provide cart/dolly access of equipment. Ramp landing at door to be sized to accommodate rotation of equipment into the building with the doors open.
 - 48" x 84" door to SIM Corridor with sound seals
 - Card and PIN access control from SIM Corridor side and on interior side of exterior double door.
- G. Interiors:**
- Floors: Static dissipative tile
 - Walls: Paint
 - Ceilings: open to structure
- H. Electrical/Communications:**
- Comm: Refer to Ground to Facility ICD – Annex A.
 - Separate and independent racks/cabinets for NIPR, Voice and Secure distribution as applicable w/ ICD-705-compliant routing support for both backbone and plenum cable distribution.
 - Rack Layout: 4-Rows of 7 Racks (20 Racks) setup in a 7-Tile Pitch installation w/ in-row chillers and independent hot-aisle containment between adjacent rows. 15'x15' space from main corridor entry reserved for UPS which shall serve the SIM area spaces, Power Distribution Rack(s), Battery Rack and Fire Suppression System Hardware. (May be installed above or below floor level, as required.)

- ICD-705 compliant Cross Room Interconnect Conduits to Comm Rooms, I.D. = 4", minimum bend radius = 7".
- UPS Power: Yes. Everything in this area shall be powered by the SIM Server Room 1 and 2 UPS system.
- Lighting: Suspended pendant mounted linear luminaire; manual on, manual off. All light fixtures in this area shall provide emergency lighting.
- Power: Separate and independent 240V 1-Phase and 208V 3-Phase power panels supporting power distribution within the Operations Area compartment outer boundary, mounted to exterior boundary wall adjacent to main corridor entry. Emergency power cutoff switch near room entrance, labeled and protected from accidental engagement. Lightning/surge suppression on all circuits. UPS system and distribution panels shall be provided by the building contractor and shall be located in the SIM (OA) Server Room. Each PDU shall have a dedicated UPS circuit to each UPS system A and B. Duplex receptacles spaced every 10 feet along the walls.

I. HVAC/Plumbing/Fire:

- Infrastructure for hot aisle containment and identified thermal loading. In-row Cooling shall be provided. 1,100,000 Btu/h maximum equipment load. Provide redundant cooling source equipment. Provide smoke exhaust system per Air Force IT room guidance (TSFPEWG G 3-600-01.01-18). Provide exhaust and detection equipment for battery storage per UFC 3-520-05.
- Fire:
 - Room must comply with Mission Assurance Category II requirements as identified in *Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations* (TSFPEWG G 3-600-01.01-18)
 - Overhead fire detection/suppression system per UFC 3-600-01 and TSFPEWG G 3-600-01.01-18 to be configured with SIM hardware layout.
 - Clean Agent Suppression System is required.
 - Provide VESDA (Very Early Smoke Detection Apparatus)
 - Provide wet pipe sprinkler system with high temperature heads (200F)
 - The sprinkler system serving the information technology equipment areas or room sprinklers shall be supplied by a separate sprinkler riser or supplied as a separate supervised zone with a dedicated water flow detection device. The riser or zone control valves shall be located outside of the space and readily accessible to emergency responders. Sprinkler activation and supervisory notifications shall be distinctly indicated at the fire alarm receiving location.

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** Heterogenous racks 1,2, and 3 (including patch panels) as shown in figures 7, 8, 9, and 10 of Ground to Facility ICD – Annex A; batteries; UPS; hot-aisle containment system for all racks (includes racks to be GFGI).
- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** Racks not identified as CFCI

ROOM NAME: 107-109 and 116-118 - SIM

- A. Function:** Operations Area (OA): Simulator training
- B. Quantity:** 3 per OA x 2 = 6 total
- C. Adjacencies:** SIM Server Rooms
- D. Minimum/Maximum Area:** 157 SF
- E. Number of Occupants:** 2+ 1 occasional observer
- F. Architectural:**
- Interior dimensions (hard, dimensional requirements finished face of wall to finished face of wall): 16' 6" x 9' 6"
 - Floor: 18" high RAF
 - Ceiling Height: 10'
 - See plans for STC ratings
 - Sliding (barn) door (48" wide/84" tall, no access control) to facilitate ingress/egress of equipment and movement in room.
- G. Interior Design:**
- Floors: Rubber Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at each workstation. Refer to Ground to Facility ICD – Annex A.
 - 1 - 42U (or equivalent) sound attenuating equipment rack. Cabling and patch panels fed from SIM Server room. Refer to Ground to Facility ICD – Annex A.
 - UPS Power: Yes. Everything in this area shall be powered by the SIM Server Room 1 or 2 UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. All light fixtures in this area shall provide emergency lighting. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls. One duplex outlet for each display. One duplex receptacle positioned to support a high-mount display centered on the two workstations. One duplex receptacle positioned to support a high-mount side-mount display "forward" of center on interior wall opposite of entrance. Provide two double-duplex (quadplex) receptacles for each workstation. Each workstation shall have a double-duplex with a dedicated UPS circuit to each UPS system A and B.

- Infrastructure for closed circuit video

I. HVAC/Plumbing/Fire:

- Independent air supply and return to mitigate against cross-contamination in the event of a smoke/fire event. (i.e., damaged/smoked electrical event in one SIM room should not force evacuation of all SIM rooms.) Provisions for 1 rack hush enclosure exhaust to be ducted into the return air. Hush (ducted rack return air goes back to HVAC system for the space only) enclosure exhaust detail to be provided by Sim Contractor. 16,600 Btu/h max equipment load. Provide redundant cooling source equipment.
- Smoke detection to provide local alarm.

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** Wall mounts for monitors, sound attenuating (“hush”) racks, patch panels.
- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** See Interior Furniture Plans

ROOM NAME: 110 and 119 - SIM Support #1 & #2

- A. Function:** Operations Area (OA): open office that is reconfigurable to various furniture configurations
- B. Quantity:** 2 (1 per OA)
- C. Adjacencies:** Near SIMs and SIM Servers
- D. Minimum/Maximum Area:** +/-500 SF
- E. Number of Occupants:** 7 workstations +3 visitors per room
- F. Architectural:**
- 26' x 19' (Minimum hard dimensional requirement which can be enlarged to fit existing structure)
 - Floor: 18" RAF
 - Walls:
 - As shown on plans
 - Ceiling height: 10' AFF
 - Doors:
 - 48" x 84" doors
 - Card reader and PIN access
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: painted gypsum board
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at each work station. Refer to Ground to Facility ICD – Annex A.
 - Monitor connectivity Cat 6 for displays from 24U (or equivalent) rack to wall display
 - UPS Power: Yes. Everything in this area shall be powered by the SIM Server Room 1 or 2 UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls. One duplex outlet for each of the three displays. Provide two double-duplex (quadplex) receptacles for each workstation and one additional auxiliary workstation. Each workstation and one additional auxiliary workstation shall have a double-duplex with a dedicated UPS circuit to each UPS system A and B.

I. HVAC/Plumbing/Fire:

- 29,000 Btu/h max equipment load. Provide redundant cooling source equipment.

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** NA
- **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
- **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 111-113 and 120-122 - SIM Briefing Room

- A. Function:** Operations Area (OA): Flexible space for briefing/debriefing
- B. Quantity:** 3 per OA x 2 = 6
- C. Adjacencies:** Near Support Rooms, but doesn't have to be directly adjacent to Support Rooms
- D. Minimum/Maximum Area:** Size to space available and number of required people, 195-300 SF +/-
- E. Number of Occupants:** 9 (8 + 1 presenter) personnel in classroom configuration (minimum) or 17 (16 + 1 presenter) personnel in presentation row (chairs w/ no tables) configuration (maximum).
- F. Architectural:**
- Structural Ceiling: STC-47 or 50, depending on whether the structural ceiling is part of the secured boundary or internal to the building
 - Finished Ceiling: 9' AFF
 - Floors: 18" raised access flooring
 - STC ratings per plans
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Painted gypsum wall board
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at each workstation. Refer to Ground to Facility ICD – Annex A.
 - Audio/Visual: Presentation podium w/ integrated workstation support (1-2 thick plus 1-2 thin clients w/ KVM switch/controls) and monitor connectivity (HDMI) or remote access control of 24U (or equivalent/appropriate sized) equipment rack hosting thick/thin client and supporting systems. Refer to Ground to Facility ICD – Annex A.
 - UPS Power: Yes. Everything in this area shall be powered by the SIM Server Room 1 or 2 UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Two duplex receptacles for presentation podium or opposite corner of same short dimension wall to support equipment rack, as applicable. One duplex outlet for display.
- I. HVAC/Plumbing:**
- 9,000 Btu/h max equipment load. Provide redundant cooling source equipment.
- J. Furniture, Fixtures, and Equipment:**

- **CFCI (Equipment with base bid):** NA
- **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
- **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 114 - Network Operations (OPS)

- A. Function:** Joint Use Area (JUA): Provides IT support/customer service to SIMs; performs maintenance and provides hardware
- B. Quantity:** 1
- C. Adjacencies:** Direct access to Comm Room and Network Ops Utility
- D. Minimum/Maximum Area:** 227 SF +/-
- E. Number of Occupants:** 9 +2-3 visitors
- F. Architectural:**
 - Walls: STC-47 as indicated on plans
 - Floor: 18" high RAF
 - Ceiling Height: 9'
 - Doors:
 - 48" x 84" door with card reader with PIN access control from corridor.
 - Card readers with PIN access on door to JUA Comm Servers
- G. Interiors:**
 - Floors: Carpet tile on raised access flooring
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex A.
 - UPS Power: Yes. Everything in this area shall be powered by the Communication Server Room UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. All light fixtures in this area shall provide emergency lighting. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus of indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 - No unique requirements
- J. Furniture, Fixtures, and Equipment:**
 - CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs

- **GFGI (NIC):** See Interior Furniture Plans

ROOM NAME: 114A - JUA Comm Servers

- A. Function:** Joint Use Area (JUA): Provides communications servers for the north end first floor
- B. Quantity:** 1
- C. Adjacencies:** Network Ops Utility
- D. Minimum/Maximum Area:** 550 sf min.
- E. Number of Occupants:** Not applicable
- F. Architectural:**
- 36'-6" x 19'-0" min. (hard dimensional requirements)
 - Floor: 18" high raised access flooring
 - Walls:
 - Exterior ICS/ICD 705 boundary walls
 - Interior STC-50 boundary walls to mitigate sound from servers into occupied spaces
 - 2-hr fire rated boundary walls to Mission Assurance Category I (actual is MAC II) requirements per *Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations* (TSFPEWG G 3-600-01.01-18)
 - Ceiling:
 - 10' AFF min.
 - 2-hr fire rated as required for Mission Assurance Category I requirements. Room is categorized as MAC II, but ceiling will be constructed to MAC I requirements.
 - Doors:
 - 72" x 84" double door at exterior. Provide concrete, exterior ramp to accommodate RAF and to connect to existing sidewalk or asphalt to provide cart/dolly access of equipment. Ramp landing at door to be sized to accommodate rotation of equipment into the building with the doors open.
 - 48" x 84" door to Network Ops with acoustical seals
 - Card and PIN access control from Network Ops side and on interior side of exterior double door.
- G. Interiors:**
- Floors: Static dissipative vinyl tile
 - Walls: Painted gypsum wallboard
 - Ceilings: open to structure
- H. Electrical/Communications:**
- Comm: Separate and independent racks for or Secure and Unsecure voice and data distribution within the Joint Use Area compartment outer boundary w/ routing support for both RAF and Plenum cable distribution. Refer to Ground to Facility ICD – Annex A
 - Provide 4-Rows of 7 Racks (20 Racks) setup in a 7-Tile Pitch installation w/ in-row chillers and independent hot-aisle containment between adjacent rows. Refer to Ground to Facility ICD – Annex A
 - Provide ICD-705-compliant Interconnect Conduits to other Comm Rooms, I.D. = 4", minimum bend radius = 7". Refer to Ground to Facility ICD Annex B.

- Provide conduit pathway for Coaxial and CAT6 cabling from JUA Server room to Antenna platform. Cabling is to be terminated in JUA Server room Rack 1 and on Antenna platform w/ bulkhead connectors in a lockable weatherproof box. Refer to Ground to Facility ICD – Annex A.
- UPS Power: Yes. Everything in this area shall be powered by the Communication Server Room UPS system.
- Lighting: Suspended pendant mounted linear luminaire; manual on, manual off. All light fixtures in this area shall provide emergency lighting.
- Power: Separate and independent 240V 1-Phase and 208V 3-Phase power panels supporting power distribution from the Communication Server Room UPS system within the Joint Use Area (JUA) Communication Server Room. Emergency power cutoff switch near room entrance, labeled and protected from accidental engagement. The bidder is free to specify which two racks are configured with the provision however they must be: 1) adjacent to each other; 2) within the same row; (3) one rack must be an end-rack. Rack receptacles should be evenly distributed across the PDU's. Provide redundant A and B UPS power to each rack from Communication Server Room UPS system. Duplex receptacles spaced every 10 feet along the walls. UPS system and distribution panels shall be provided by the building contractor and shall be located in the Communication Server Room.

I. HVAC/Plumbing/Fire:

- Infrastructure for hot aisle containment and identified thermal loading. In-row Cooling shall be provided. 650,500 Btu/h maximum equipment load. Provide redundant cooling source equipment. Provide smoke exhaust system per Air Force IT room guidance (TSFPEWG G 3-600-01.01-18). Provide exhaust and detection equipment for battery storage per UFC 3-520-05.
- Fire:
 - Room must comply with Mission Assurance Category I requirements as identified in *Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations* (TSFPEWG G 3-600-01.01-18)
 - Overhead fire detection/suppression system as required per UFC 3-600-01 and TSFPEWG G 3-600-01.01-18 to be configured with SIM hardware layout.
 - Clean Agent Suppression System is required.
 - Provide VESDA (Very Early Smoke Detection Apparatus).
 - The sprinkler system serving the information technology equipment areas or room sprinklers shall be supplied by a separate sprinkler riser or supplied as a separate supervised zone with a dedicated water flow detection device. The riser or zone control valves shall be located outside of the space and readily accessible to emergency responders. Sprinkler activation and supervisory notifications shall be distinctly indicated at the fire alarm receiving location.

J. Furniture, Fixtures, and Equipment: Racks, hot aisle containment, battery rack, UPS

- **CFCI (Equipment with base bid):** Heterogenous racks 1,2, and 3 (including patch panels) as shown in figures 12 through 14 of Ground to Facility ICD – Annex A; batteries; UPS; hot-aisle containment system for all racks (includes area for racks to be GFGI). Refer to Ground to Facility ICD – Annex A for “antenna farm” requirements
- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** Racks not listed as CFCI, Antennas

ROOM NAME: 114B - Network Ops Utility

- A. Function:** Joint Use Area (JUA): IT storage and maintenance
- B. Quantity:** 1
- C. Adjacencies:** Direct access from Network Operations and Comm Room
- D. Minimum/Maximum Area:** As shown +/-
- E. Number of Occupants:** 2
- F. Architectural:**
- Ceiling Height: 9'
 - Card reader from Network Ops.
 - 48" x 84" door
- G. Interiors:**
- Floors: Carpet tile on raised access flooring
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex A.
 - UPS Power: Yes. Everything in this area shall be powered by the Communication Server Room UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. All light fixtures in this area shall provide emergency lighting. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 123 - OPS Support/STEP Desk

- A. Function:** Joint Use Area (JUA): Ops superintendent coordinates and executes daily flight tasks, schedules
- B. Quantity:** 1
- C. Adjacencies:**
- D. Minimum/Maximum Area:** As shown +/-
- E. Number of Occupants:** 4 (typical) -12 (max.)
- F. Architectural:**
- Floor: 18" high RAF
 - Ceiling height: 9'
 - 48" wide/84" tall door
 - Card reader with PIN access
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: Yes. Everything in this area shall be powered by the Communication Server Room UPS system.
 - Lighting: Manual on when occupant enters. Automatic off within 15 minutes of no activity. All light fixtures in this area shall provide emergency lighting. Provide direct and indirect lighting fixtures for this area. Provide controls to allow the user to select the amount of direct versus indirect lighting. Controls shall provide the following modes:
 - 100% direct lighting and 0% indirect lighting
 - 0% direct lighting and 100% indirect lighting
 - Selectable percentage 0-100% of indirect lighting versus direct lighting. For example the user selects 40% direct and 60% indirect lighting.
 - Dimming capability for both indirect and direct lighting (warmer light temperature). User shall be able to dim in any of the modes listed above.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide duplex at each display location.
- I. HVAC/Plumbing/Fire:**
- HVAC: 16,500 Btu/h max equipment load.
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 124 - Security Office

- A. Function:** Open office processing security paperwork, maintaining training records; will be the office that monitors the entry to secured entry point; area for issuing IDs.
- B. Adjacencies:** Near secured entrance
- C. Quantity:** 1
- D. Number of Occupants:** 6 personnel at 6 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - Monitor wall w/ CCTV to secured entrance.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide power to monitor wall w/ CCTV.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements. 16,600 Btu/h max equipment load.
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 125 - Squadron Exec/CSS Office

- A. Function:** Command Suite open office: Executive (Exec) officer and 2 Commander Support Staff (CSS)
- B. Adjacencies:** 1st Floor; next to commander's office
- C. Quantity:** 1
- D. Number of Occupants:** 3 personnel at 3 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Provide built-in countertop area for break area, printer, and storage. See plans.
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Executive Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 125A - Squadron Commander's Office

- A. Function:** Command Suite: Private office with video teleconferencing capabilities
- B. Adjacencies:** 1st Floor, Squadron Conference Room, DS Office, Senior Enlisted Advisor Office, 1st Sergeant Office
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation + 2 visitors
- E. Minimum/Maximum Area:** 140-150 s.f.
AFMAN 32-1084 Table 6.2/1.2 for Type C office
- F. Architectural:**
- Ceiling: 9' A.F.F.;
 - Structural Ceiling: STC-50
 - Walls: STC-50
 - Door: STC-50 min. with full sound gasketing and drop bottom
- G. Interiors:**
- Floors: Executive Carpet Tile
 - Walls: Wallcovering wainscot with paint above
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 125B - Director of Staff (DS) Office

- A. Function:** Command Suite private office; manager of task allocation throughout the unit
- B. Adjacencies:** 1st Floor; commander and Exec/CSS Office
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation + 2 visitors
- E. Minimum/Maximum Area:** 100-120 s.f.
AFMAN 32-1084 Table 6.2/1.2 (rank = major)
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Executive Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 125C - Senior Enlisted Advisor Office

- A. Function:** Private office
- B. Adjacencies:** Squadron Commander
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation + 2 visitors
- E. Minimum/Maximum Area:** 100-120 s.f.
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Executive Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 125D - First Sergeant Office

- A. Function:** Command Suite: Private office
- B. Adjacencies:** 1st Floor
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation + 2 visitors
- E. Minimum/Maximum Area:** 100-120 s.f.
AFMAN 32-1084 Table 6.2/1.2 (master sgt.)
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Executive Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 126 - Squadron Conference Room

- A. Function:** Command Suite: Conference Room for 25 people (12 around table + 12 chairs + 1 workstation) with AF7 video teleconference system
- B. Adjacencies:** 1st Floor; near squadron commander
- C. Quantity:** 1
- D. Number of Occupants:** 25
- E. Minimum/Maximum Area:** As shown +/- (max. 500 s.f.)
- F. Architectural:**
- Walls: STC-50;
 - Door: STC-50 with full sound gasketing and drop bottom
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Executive carpet tile
 - Walls: Paint; chair rail
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations/podium. Refer to Ground to Facility ICD – Annex B.
 - Audio/Visual: 1-2 thick plus 1-2 thin clients w/ KVM switch/controls, 4K Elmo Document Projector and monitor connectivity (HDMI). Presentation podium w/ KVM remote access control.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity. Provide dimmable and scene lighting for presentations.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide dedicated circuit with double duplex receptacle for podium. Provide a duplex receptacle for each large display. Provide duplex receptacle under conference table.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** video teleconference system

ROOM NAME: 127 - Comm-IT Open Office

- A. Function:** FTU Operations Squadron Comm-IT Open Office; maintaining network and computers; Storage for spare monitors, computers, printer cartridges, etc.
- B. Adjacencies:** As shown; needs access to Secure Comm room
- C. Quantity:** 1
- D. Number of Occupants:** 6 personnel at 6 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements.
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 128 - Contractor Office

- A. Function:** FTU Operations open office
- B. Adjacencies:** 1st Floor
- C. Quantity:** 1
- D. Number of Occupants:** 6 personnel at 6 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
 - Ceiling height: 9'
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 129 - Planning Support

- A. Function:** Open office
- B. Quantity:** 1
- C. Adjacencies:** Near SIM Area
- D. Minimum/Maximum Area:** As shown +/-
- E. Number of Occupants:** 4 workstations
- F. Architectural:**
- Ceiling height: 10' AFF
 - Door:
 - 48" x 84"
 - Card reader with PIN
- G. Interiors:**
- Floors: Luxury Vinyl Tile
 - Walls: Painted gypsum board
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - Monitor connectivity (HDMI) from 24U (or equivalent) rack to wall display
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity. Provide dimming capability.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Four duplex receptacles at shredder/rack location supporting shredder and 24U (or equivalent) equipment rack for presentation systems. Two (2) x 208/120VAC 3-Phase 20A circuits with NEMA L21-20R connectors to each of the two Hush racks.
- I. HVAC/Plumbing/Fire:**
- 37,500 Btu/h max equipment load.
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 130-132 - Student Flight Room

- A. Function:** Edges of walls 8 workstations (two monitors and a keyboard) with table in the middle of the room for 8 people
- B. Adjacencies:** Not applicable
- C. Quantity:** 3
- D. Number of Occupants:** 8-14
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 133-135 - Academic Classroom

- A. Function:** FTU Operations: Classrooms
- B. Adjacencies:** As shown
- C. Quantity:** 2 large classrooms (one room to be divided with moveable partition so as to provide one large classroom and two smaller classrooms)
- D. Number of Occupants:** 16 personnel at 16 desks; 2 classrooms with 8 students.
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Walls: STC-50 per UFC 3-101-01
 - Doors: STC-35 with sound seals
 - Moveable or accordion-type partition: STC-40
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. One connection to each student and instructor/podium and run cord to flat screen. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide a double duplex receptacle for each desk and podium. Provide duplex receptacle for the large wall mount displays at the front of the classroom
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 201 - Mass Briefing Room (MBR)

- A. Function:** Dissemination of information to staff on several large screens; VTC capabilities.
- B. Quantity:** 1
- C. Adjacencies:** Secure Comm-MBR
- D. Minimum/Maximum Area:** Existing, as shown
- E. Number of Occupants:** 100-130
- F. Architectural:**
- Walls: STC-50
 - Floor/ceiling below: STC-50
 - Doors: STC-50 with full sound seals and drop bottoms
 - Ceiling height: 12' +
 - Remove and replace seating with new, similar in style and with tablet arm assemblies.
- G. Interiors:**
- Remove all existing finishes, including wood paneling and acoustic panels.
 - Floors: Broadloom Carpet
 - Walls: Gypsum wallboard and acoustic panels (as acoustic study dictates)
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at podium and as identified in Ground to Facility ICD – Annex B.
 - A/V: projection/video/audio control systems
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide dedicated circuit with double duplex receptacle for podium. Provide duplex receptacle for large displays and projector.
- I. HVAC/Plumbing/Fire:**
- Per building codes and specs
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):**
 - Ceiling mounts for the projectors
 - Two pull-down screens at the front of the stage to cover the monitors
 - ABA/ADA lift at the stage
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs plus two ceiling mounted projectors
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 201A – SECURE COMM – MASS BRIEFING ROOM

- A. Function:** Location for providing network access to the mass briefing room
- B. Quantity:** 1
- C. Adjacencies:** Mass Briefing Room
- D. Minimum/Maximum Area:** As shown +/-
- E. Number of Occupants:** Not regularly occupied
- F. Architectural:**
- Walls: STC-50 as shown on plans to maintain STC boundary of the Mass Briefing Room
 - Door: Keyed lock
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Refer to Ground to Facility ICD – Annex B..
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide dedicated power circuits and receptacles for audio/video equipment.
- I. HVAC/Plumbing/Fire:**
- Per building codes and specs
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): NA

ROOM NAME: 202 - Break Room

- A. Function:** Break room, snack food, coffee area, etc.
- B. Adjacencies:** Central to occupants of 2nd Floor
- C. Quantity:** 1
- D. Number of Occupants:** Not regularly occupied
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Counters with upper and base cabinets, 18' in length.
 - Ceiling height: 9'
 - Doors: Provide magnetic hold opens with fusible links.
 - Windows: Provide storefront windows along the entire length of corridor. Windows shall be 4'-0" high above finished floor with header to match height of doors.
- G. Interiors:**
- Floors: Porcelain Tile
 - Walls: Paint; accent tile backsplash at countertop
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: N/A
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide dedicated circuits for each microwave, refrigerator, and ice maker. Provide four additional outlets on countertops for coffee pots and other appliances.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC requirements
 - Provide kitchen sink
 - Provide water and drain for ice maker
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 204 - Contractor Flight Room

- A. Function:** Open office with 10 workstations (two monitors and a keyboard) with table in the middle of the room
- B. Adjacencies:** 2nd Floor, Flight Commander Office
- C. Quantity:** 1
- D. Number of Occupants:** 10-15
- E. Minimum/Maximum Area:** As shown
- F. Architectural:**
- Door has card reader and PIN access
 - Ceiling height: 9'
 - 15 people/ 10 workstations per room
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 204A - Contractor Flight Commander Office

- A. Function:** Private office
- B. Quantity:** 1
- C. Adjacencies:** 2nd Floor, Contractor Flight Commander's Office is to be in Contractor Flight Room
- D. Minimum/Maximum Area:** 100-120 SF
AFMAN 32-1084 Table 6.2/1.2
- E. Number of Occupants:** 1 per office
- F. Architectural:**
 - Ceiling height: 9'
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 205 and 212 Storage

- A. Function:** Storage of office supplies or other items
- B. Adjacencies:** As shown
- C. Quantity:** As shown/required
- D. Number of Occupants:** N/A
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 8' min. / 9' preferred
- G. Interiors:**
- Floors: Same as adjacent room
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: N/A
 - UPS Power: No
 - Lighting: Linear pendant mounted lensed luminaires. Switch on, automatic off in 15 minutes if not occupied
 - Power: Two duplex receptacles per room
- I. HVAC/Plumbing/Fire:**
- No unique HVAC requirements
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): NA
 - GFGI (NIC): NA

ROOM NAME: 206-208 - Flight Room

- A. Function:** Open office with 10 workstations (two monitors and a keyboard) with table in the middle of the room
- B. Adjacencies:** 2nd Floor, Flight Commander Office
- C. Quantity:** 3
- D. Number of Occupants:** 10-16
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Door has card reader and PIN access
 - Ceiling height: 9'
 - 16 people/ 10 workstations per room
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 206A – 208A Flight Commander Office

- A. Function:** Private office
- B. Quantity:** 3
- C. Adjacencies:** 2nd Floor, each Flight Commander's Office is to be in a Flight Room
- D. Minimum/Maximum Area:** 100-120 SF
AFMAN 32-1084 Table 6.2/1.2
- E. Number of Occupants:** 1 per office
- F. Architectural:**
 - Ceiling height: 9'
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): NA

ROOM NAME: 209-210 - Briefing Room "A"

- A. Function:** Multipurpose room used for mission planning, briefings and debriefings, or for Standard Evaluation Testing. 6 desks around walls with tables for 4 people in middle.
- B. Adjacencies:**
- C. Quantity:** 2
- D. Number of Occupants:** 10
- E. Minimum/Maximum Area:** 320 s.f. +/-
- F. Architectural:**
- Walls: STC 50 for VTC capability
 - Door:
 - STC-50 with sound seals;
 - Card reader with PIN
 - Floor: STC-50
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - Workstation connects to monitor
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 211 - Briefing Room "B"

- A. Function:** 1 desk in a corner with conference table (12 people) in middle. Used for briefings and debriefings or for academic instruction
- B. Adjacencies:** NA
- C. Quantity:** 1
- D. Number of Occupants:** 17
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Walls: STC 50 for VTC capability
 - Door:
 - STC-50 with sound seals;
 - Card reader with PIN
 - Floor: STC-50
 - Ceiling height: 9'
 - 16 personnel + 1 workstation per room
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - Workstation connects to monitors
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 213 - Weapons/Tactics Office

- A. Function:** FTU Operations: Open office; individuals in charge of developing tactics, techniques, and procedures
- B. Adjacencies:** Near Intel Office
- C. Quantity:** 1
- D. Number of Occupants:** 4 personnel at 4 workstations +2 visitors
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
 - Door with card reader and PIN
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements. 45,000 Btu/h max equipment load.
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 214 - Copy Room

- A. Function:** Common space for copiers, paper storage, supplies, etc. Networked station for large capacity print jobs, other areas with small printers, scanners
- B. Adjacencies:** central location for common usage
- C. Quantity:** 1
- D. Number of Occupants:** not applicable
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Porcelain Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at copier locations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide dedicated circuit for each printer or copier.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 215 - Assistant Director of Operations (ADO) Office

- A. Function:** Open office to support DO
- B. Adjacencies:** DO Office
- C. Quantity:** 1
- D. Number of Occupants:** 3 personnel at 3 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Door with card reader with PIN
 - Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique HVAC/Plumbing requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 216 - Director of Operations (DO) Office

- A. Function:** Office for DO and 5 visitors, with VTC
- B. Adjacencies:** As shown
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation + 5 visitors
- E. Minimum/Maximum Area:** 150 s.f. (lt. col.)
- F. Architectural:**
- Ceiling: 9'
 - Door: Card reader with PIN
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - AF7 VTC
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 217 - Scheduling Office

- A. Function:** Open office for scheduling of SIM and flight activities
- B. Adjacencies:** Near DO office desired
- C. Quantity:** 1
- D. Number of Occupants:** 4 personnel at 4 workstations
- E. Minimum/Maximum Area:** As shown
- F. Architectural:**
 - Ceiling height: 9'
 - Door with card reader and PIN
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 218-Training Office

- A. Function:** Open office managing training and documentation processing
- B. Adjacencies:** near Standards/Eval
- C. Quantity:** 1
- D. Number of Occupants:** 4 personnel at 4 workstations
- E. Minimum/Maximum Area:** As shown
- F. Architectural:**
- Ceiling height: 9'
 - Door with card reader and PIN
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

- No unique requirements

ROOM NAME: 219 - Standards/Evaluations Office

- A. Function:** Open office; manages and processes qualification documentation and manages evaluation periods
- B. Adjacencies:** Near DO office and Training Office
- C. Quantity:** 1
- D. Number of Occupants:** 4 personnel at 4 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
- No unique requirements
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): See Interior Furniture Plans and specs

ROOM NAME: 220 - Conference Room

- A. Function:** Meeting space for 14-25 people in multiple configurations
- B. Quantity:** 1
- C. Adjacencies:** As shown
- D. Minimum/Maximum Area:** 420-500 SF
- E. Number of Occupants:** 14-25
- F. Architectural:**
- Ceiling height: 10'
 - Room to be able to be configured for 14 (12 + 1 computer operator + 1 presenter) personnel in classroom configuration or 25 (11 at table + 12 at room side + 1 computer operator + 1 presenter) personnel in briefing room configuration.
 - Walls: STC-50
 - Floor: STC-50
 - Door:
 - STC-50 with full sound gasketing and drop bottom
 - Card reader with PIN
- G. Interiors:**
- Floors: Carpet tile
 - Walls: Paint; chair rails
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstation and podium. Refer to Ground to Facility ICD – Annex B..
 - Audio/Visual: Presentation podium w/ integrated workstation support (1-2 thick plus 1-2 thin clients w/ KVM switch/controls) and monitor connectivity (HDMI) or remote access control of 24U (or equivalent/appropriate sized) equipment rack.
 - UPS Power: No.
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity. Dimming capability. Provide dimmable and scene lighting for presentations.
 - Power: Duplex receptacles spaced every 10 feet along the walls. Provide double duplex receptacle in corner adjacent to displays/opposite of presentation podium to support AFSEVEN VTC equipment and at display locations. Provide duplex receptacle under conference table.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** VTC equipment and as indicated on plans

ROOM NAME: 221 - Intel Office

- A. Function:** Open office processing intel documentation
- B. Adjacencies:** Near intel fight commander's office
- C. Quantity:** 1
- D. Number of Occupants:** 8 personnel at 8 larger workstations (each with 4 screens (2x2))
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
 - Door with card reader and PIN
 - Ceiling height: 9'
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets at workstations and printer locations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 222 - SARM Office

- A. Function:** Open office for Squadron Aviation Resource Managers (SARM)
- B. Adjacencies:** As shown
- C. Quantity:** 1
- D. Number of Occupants:** 5 personnel at 5 workstations
- E. Minimum/Maximum Area:** As shown +/-
- F. Architectural:**
- Ceiling height: 9'
 - Door with card reader and PIN
- G. Interiors:**
- Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
- Comm: Secure and Non-secure voice and data outlets at workstations. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
-
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** NA
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** See Interior Furniture Plans and specs

ROOM NAME: 223 - Intel Flight Commander (IFC) Office

- A. Function:** Private Office for Flight Commander and 2 visitors
- B. Adjacencies:** Next to Intel Office
- C. Quantity:** 1
- D. Number of Occupants:** 1 person at 1 workstation +2 guests
- E. Minimum/Maximum Area:** 100-120 s.f.
- F. Architectural:**
 - Ceiling height: 9'
 - Door with card reader and PIN
- G. Interiors:**
 - Floors: Carpet Tile
 - Walls: Paint
 - Ceilings: ACT
- H. Electrical/Communications:**
 - Comm: Secure and Non-secure voice and data outlets. Refer to Ground to Facility ICD – Annex B.
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 -
- J. Furniture, Fixtures, and Equipment:**
 - CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): See Interior Furniture Plans and specs
 - GFGI (NIC): See Interior Furniture Plans and specs

ROOM NAME: COMM-1 - Comm Entrance Facility

- A. Function:** The comm entrance room will be the termination point for all fiber connections with the ITN as well as the fiber and CAT6 conduits between the other facility comm rooms. Refer to Ground to Facility ICD – Annex B.
- B. Quantity:** 1
- C. Agencies:** Not applicable
- D. Minimum/Maximum Area:** Existing, as shown +/-
- E. Number of Occupants:** Not applicable
- F. Architectural:**
- Walls, Ceiling: 1-hr fire rated boundary walls and ceiling to Mission Assurance Category II requirements per Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)
 - Door: Keyed for base CES access
- G. Interiors:**
- Floors: Static Dissipative Vinyl Tile
 - Walls: Painted gypsum wallboard
 - Ceilings: open to structure
- H. Electrical/Communications:**
- Existing location of where the communication lines enter Bldg. 631.
 - Separate and independent 45 RU racks for Non Secure Data and Non Secure Voice distribution as applicable. Telecommunications racks provisioned with fiber and copper patch panels as applicable. ICD-705-compliant routing support for both backbone and plenum cable distribution. Interconnect Conduits to other Comm Rooms, I.D. = 4", minimum bend radius = 7". Refer to Ground to Facility ICD – Annex B.
 - UPS: No
 - Lighting: Suspended pendant mounted linear luminaire. Manual on. Manual off.
 - Power: Double Duplex Receptacle for Unclassified Communication Rack. Duplex receptacles spaced every 10 feet along the walls
- I. HVAC/Plumbing/Fire:**
- 12,000 Btu/h heat load
 - Room must comply with Mission Assurance Category II requirements as identified in Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)
- J. Furniture, Fixtures, and Equipment:**
- **CFCI (Equipment with base bid):** Separate and independent Comm racks, LC to CAT6 Media Converter, LC and CAT 6 Patch Panels as required. Refer to Ground to Facility ICD Annex -B.
 - **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
 - **GFGI (NIC):** NA

ROOM NAME: COMM-2-3 - Unclassified Comm Room

A. Function:

The first floor (FL1) shall serve as the homerun location for all Non-Secure Area workstation ports which shall consist solely of CAT6 connections. Fiber conduits shall also be provisioned from the comm entrance facility to the FL1 Unclassified Comm Room to provide future flexibility and growth. Refer to Ground to Facility ICD – Annex B.

The second floor (FL2) Unclassified Comm Room shall be the homerun location for all 2nd floor unclassified workstation ports including the mass briefing room. Refer to Ground to Facility ICD – Annex B.

B. Quantity: 2 (1 per floor)

C. Adjacencies: Not applicable

D. Minimum/Maximum Area: As shown +/-

E. Number of Occupants: Not applicable

F. Architectural:

- Walls, Ceiling: 1-hr fire rated boundary walls and ceiling to Mission Assurance Category II requirements per Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)
- Door: Keyed for base CES access

G. Interiors:

- Floors: Static Dissipative Vinyl Tile
- Walls: Painted gypsum wallboard
- Ceilings: open to structure

H. Electrical/Communications:

- Separate and independent 45 RU racks for Non Secure Data and Non Secure Voice distribution as applicable. Telecommunications racks provisioned with fiber and copper patch panels as applicable. ICD-705-compliant routing support for both backbone and plenum cable distribution. Interconnect Conduits to other Comm Rooms, I.D. = 4", minimum bend radius = 7". Refer to Ground to Facility ICD – Annex B.
- UPS: No
- Lighting: Suspended pendant mounted linear luminaire. Manual on. Manual off.
- Power: Double Duplex Receptacle for Unclassified Communication Rack. Duplex receptacles spaced every 10 feet along the walls

I. HVAC/Plumbing/Fire:

- 12,000 Btu/h heat load
- Room must comply with Mission Assurance Category II requirements as identified in Air Force Fire Protection Engineering Criteria And Technical Guidance for Mission Continuity of Electronic, Information Technology, And Telecommunications Equipment Installations (TSFPEWG G 3-600-01.01-18)

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** Separate and independent Comm racks, LC to CAT6 Media Converter, LC and CAT 6 Patch Panels as required. Refer to Ground to Facility ICD Annex -B.

- **CFCI (Furniture Bid):** See Interior Furniture Plans and specs
- **GFGI (NIC):** NA

ROOM NAME: Corridors

A. Function: Circulation

B. Adjacencies: N/A

C. Quantity: As shown/required

D. Number of Occupants: Not regularly occupied

E. Minimum/Maximum Area: N/A

F. Architectural:

- Ceiling height: 8' min. / 9' preferred
- Corridor width: 5' min. throughout
- 6' wide corridors are preferred in the SIM (OA) areas on the north end of the first floor in order to move equipment between rooms. Plans indicate some areas that this may not be feasible. DOR shall verify existing conditions, review hard dimensional requirements of rooms, and coordinate with the customer on how best to accommodate this
- Opening in the existing atrium between Main Corridors COR-3 and COR-20 to be filled with laminated glass

G. Interiors:

- Floors: Luxury Vinyl Tile
- Walls: Paint
- Ceilings: ACT

H. Electrical/Communications:

- Comm: Secure and Non-secure voice and data outlets at printer locations where applicable. Refer to Ground to Facility ICD – Annex B.
- UPS Power: No
- Lighting: Linear pendant mounted lensed luminaires with uplight component. Controls: Automatic on to full design lighting power when occupied. Automatic to 50% reduced light output within 15 minutes of no activity. Integrated with fire alarm system for full lumen output for egress.
- Power: Duplex receptacles spaced every 50 feet along the walls. Provide at least two duplex outlets on opposing walls in Main Corridors COR-3 and COR-20 in the central octagon shaped areas.
- Switchable "Active Operations" indicator light. (3-pole switch, at entry and exit points. Illuminates "Active Operations" indicator. "On/Off" indicator located next to switch.)
- Corridor 1 to have CCTV camera facing the vestibule
- Provide IDS/glass breaks on exterior windows in upper level of the atrium

I. HVAC/Plumbing/Fire:

- No unique HVAC requirements
- No plumbing requirements
- Fire ratings as required per NFPA 101, UFC 3-600-01, and other requirements in this RFP

J. Furniture, Fixtures, and Equipment:

- CFCI (Equipment with base bid): NA

- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** NA

ROOM NAME: SIM Corridor

A. Function: Operations Area (OA): Circulation

B. Quantity: As shown

C. Adjacencies: As shown

D. Minimum/Maximum Area: As required

E. Number of Occupants: Not applicable

F. Architectural:

- 6' wide corridors are preferred in order to move equipment between rooms. Plans indicate some areas that this may not be feasible. DOR shall verify existing conditions, review hard dimensional requirements of rooms, and coordinate with the customer on how best to accommodate this.
- Floor: 18" high RAF
- Ceiling height: 9'
- Main entry door for each OA:
 - 48" x 84" tall door
 - Card reader with PIN access control and electronic strike for main entrance
- Other exit doors are exit only.

G. Interiors:

- Floors: Raised access flooring with rubber tile
- Walls: Paint
- Ceilings: ACT

H. Electrical/Communications:

- Comm: Not applicable
- UPS Power: Yes. Everything in this area shall be powered by the SIM Server Room 1 or 2 UPS system.
- Lighting: Linear pendant mounted lensed luminaires with uplight component. Controls: Automatic on to full design lighting power when occupied. Automatic to 50% reduced light output within 15 minutes of no activity. Integrated with fire alarm system for full lumen output for egress.
- Power: Duplex receptacles spaced every 50 feet along the walls
- Switchable white noise generator system with speakers distributed near the secure boundary.
- Switchable "Active Operations" indicator light. (3-pole switch, 1 ea at Briefing/Support Accessway and SIM Accessway Main Corridor door. Illuminates "Active Operations" indicator lights located at Briefing/Support Accessway and SIM Accessway entries. "On/Off" indicator located next to switch.)

I. HVAC/Plumbing/Fire:

- No unique HVAC/Plumbing requirements
- No plumbing requirements
- Fire ratings as required per NFPA 101, UFC 3-600-01, and other requirements in this RFP

J. Furniture, Fixtures, and Equipment:

- **CFCI (Equipment with base bid):** NA
- **CFCI (Furniture Bid):** NA
- **GFGI (NIC):** NA

ROOM NAME: MEN-1-2 and WOM-1-2 - Restrooms

- A. Function:** Separate sanitary facilities for men and women. Comply with ABA standards.
- B. Quantity:** 6, as shown
- C. Adjacencies:** As shown
- D. Minimum/Maximum Area:** As required for an efficient layout
- E. Number of Occupants:** 100 total building occupancy
- F. Architectural:**
- Ceiling height: 9'
 - See specs for restroom accessories
 - Provide double tier lockers in quantities as show on plans.
 - Provide folding seats in showers as shown
- G. Interiors:**
- Floors: Porcelain tile
 - Walls: Porcelain tile wainscot with paint above
 - Ceilings: Painted water resistant gypsum board
- H. Electrical/Communications:**
- Comm: Not Applicable
 - UPS Power: No
 - Lighting: Recessed downlights and over surface vanity wrap. Automatic on when occupant enters and automatic off within 15 minutes
 - Lighting Shower Areas: Surface or recessed lensed waterproof luminaires. Manual on and manual off.
 - Power: One GFCI at each set of lavatories
- I. HVAC/Plumbing/Fire:**
- Plumbing Fixtures per UFC 3-420-01 and IPC
 - Based on 85% men and 15% women
 - Use assembly occupancy for Heritage Room
 - Use business occupancy everywhere else; Mass Briefing Room is assumed to be utilized only by personnel in the building.
 - 2 showers for men; 1 shower for women
 - Electric water coolers with bottle fillers in locations as shown on plans
 - Exhaust per ASHRAE 62.1
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): NA
 - GFGI (NIC): NA

ROOM NAME: UTL-1 - Janitor's Closet

- A. Function:** Storage of cleaning supplies
- B. Adjacencies:** Near restrooms and central to common use areas
- C. Quantity:** 2 (1 new, 1 existing)
- D. Number of Occupants:** NA
- E. Minimum/Maximum Area:** As required for equipment
- F. Architectural:**
- Ceiling height: open to structure
 - Door with lock to be keyed to base standard
 - Provide mop rack
 - Provide built-in 12" deep shelving for length of one long wall in each janitor's closet
- G. Interiors:**
- Floors: Porcelain Tile
 - Walls: Paint, 4' Ceramic tile wainscot with paint above on wet walls and sides of janitor's sink
 - Ceilings: painted structure
- H. Electrical/Communications:**
- Comm: NA
 - UPS Power: No
 - Lighting: Recessed direct/indirect luminaire. Manual on when occupant enters. Automatic off within 15 minutes of no activity.
 - Power: Duplex receptacles spaced every 10 feet along the walls
- I. HVAC/Plumbing/Fire:**
- Janitor's sink (existing to be removed and replaced)
- J. Furniture, Fixtures, and Equipment:**
- CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): NA
 - GFGI (NIC): NA

ROOM NAME: VEST-1 - Vestibule

- A. Function:** Circulation.
- B. Adjacencies:** N/A
- C. Quantity:** As shown/required
- D. Number of Occupants:** Not regularly occupied
- E. Minimum/Maximum Area:** N/A
- F. Architectural:**
 - Ceiling height: 8' min. / 9' preferred
- G. Interiors:**
 - Floors: Recessed entrance mat
 - Walls: Paint
 - Ceilings: Humidity resistant ACT
- H. Electrical/Communications:**
 - Comm: N/A
 - UPS Power: No
 - Lighting: Linear pendant mounted lensed luminaires with uplight component. Controls: Automatic on to full design lighting power when occupied. Automatic to 50% reduced light output within 15 minutes of no activity. Integrated with fire alarm system for full lumen output for egress.
 - Power: Duplex receptacles spaced every 50 feet along the walls.
- I. HVAC/Plumbing/Fire:**
 - No unique HVAC requirements
 - No plumbing requirements
 - Fire ratings as required per NFPA 101, UFC 3-600-01, and other requirements in this RFP
 - Location for Fire Alarm Panel
- J. Furniture, Fixtures, and Equipment:**
 - CFCI (Equipment with base bid): NA
 - CFCI (Furniture Bid): NA
 - GFGI (NIC): NA

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SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX B AIR FORCE SUSTAINABILITY SCORESHEET



**US Army Corps
of Engineers** ®
Omaha District

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Air Force Sustainability Requirements Scoresheet

HPSB COMPLIANCE (Updated Jan 2017)

* required entry

General Information



**SURVEY
INCOMPLETE**

INCOMPLETE	
GFND00100	Project ID (e.g. ABCD12345)
	Real Property Unique ID (RPUID)
631	Facility Number
Formal Training Unit	Building Name
Grand Forks AFB	Installation
Grand Forks	City
ND	State
Yes	CONUS
AMC	MAJCOM
USACE	Construction Agent
	AFCEC DM/CM (Last Name, First Name)
	PA
39,951	Building Size (SF)
2023	Program Year (FY####)
RFP/35% Design	Project Phase
04/18/22	Design Started (MM/DD/YY)
	BOD (MM/DD/YY)
GBI GP	Guiding Principles Compliance Certification Method
	<input type="text"/> Date Project Registered (MM/DD/YY)
	<input type="text"/> Date Project Certified (MM/DD/YY)
100%	HPSB Compliant
30%	Energy Efficiency Achieved (% below ANSI/ASHRAE/IESNA Standard 90.1-2013)
2017V1	Scoresheet version

*
*
*

Air Force Sustainability Requirements Scoresheet

HPSB COMPLIANCE (Updated Jan 2017)

* required entry

Color Coding: See Instructions Tab for more detail

Drop-Down Box	Yes or N/A
No Entry Required	No
Custom Entry	Recommended not Required

90.1-2013

HPSB I: Employ Integrated Design Principles (UFC 1-200-02 para 2-2)

Total Points	2	Possible Points	2
Yes	HPSB I.1	Integrated Design	1
Yes	HPSB I.2	Commissioning	1

HPSB II: Optimize Energy Performance (UFC 1-200-02 para 2-3)

Total Points	5	Possible Points	5
Yes	HPSB II.1	Energy Efficiency	1

Yes	Reduce energy use 30% below ANSI/ASHRAE/IESNA Standard 90.1-2013 or IECC, or if not - achieve maximum energy efficiency that is lifecycle cost effective
30.0%	Insert percentage below ANSI/ASHRAE/IESNA Standard 90.1-2013 or IECC, in terms of energy use (e.g. 32)
	Insert building energy intensity (kBtu/yr-sqft) calculated IAW 10 CFR 433
N/A	Roof Attributes (Recommended)
	Select roof types (Check below)

- ☐ Cool roof ☐ Solar electric ☐ Solar Passive
☐ Green roof ☐ Solar thermal

Energy Efficient Products

Yes

N/A	HPSB II.2	On-site Renewable Energy	1
-----	-----------	--------------------------	---

N/A	Installed renewable energy elements or projects were not lifecycle cost effective
	Renewable energy types (check below)

- ☐ Solar PV ☐ Geothermal ☐ Hydro ☐ Waste to Energy
☐ Solar CP ☐ GSHP ☐ Wind ☒ Renewables were not lifecycle cost effective
☐ Solar Thermal Electric

	Insert generation capacity (kW)
	Insert percentage of total building

N/A	HPSB II.3	On-site Renewable Energy - Solar Hot Water Heater System	1
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N/A	Installed solar hot water heater system or found installation not lifecycle cost effective
	Insert generation capacity (MMBtu/yr)
	Insert percentage of demand

Yes	HPSB II.4	Metering	1
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Yes	Electric Metering: Select N/A if no service
Yes	Natural Gas Metering: Select N/A if no service
N/A	Steam Metering: Select N/A if no service

HPSB III: Protect and Conserve Water (UFC 1-200-02 para 2-4)

Total Points	6	Possible Points	6
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Yes	HPSB III.1	Indoor Water	1
Yes		Indoor Water Metering	1
N/A	HPSB III.2	Outdoor Water	1
N/A		Outdoor Water Metering	1
N/A	HPSB III.3	Alternative Water	1
Yes	HPSB III.4	Stormwater Management (LID Documentation per UFC 3-210-10)	1

-1900.0	Change in Impervious Area (SF)
\$0.00	Pre-Award Cost Estimate (\$)
Yes	Project addressed EISA 438
0	EISA Technical Constraints

- ☐ Retaining stormwater impact receiving water flow ☐ Shallow bedrock, contaminated soil, high ground water table, underground utilities ☐ Soil infiltration capacity limited
☐ Site too small to infiltrate significant volume ☐ Non-potable water demand to small ☐ Structural, plumbing, and other mods not feasible
☐ State or local restrict water harvesting ☐ State or local restrict use of green ☐ Other

0.0%	Percent Increase in Stormwater Runoff for 95 Percentile Storm (%) - or- Percent Increase in Stormwater Runoff from continuous simulation model, published data, studies, or other established tools (Reference UFC 3-210-10 Figure 2-1 Implementation of EISA Section 438)
On-Site	LID Features Locations
0	Integrated Management Practices Employed

Air Force Sustainability Requirements Scoresheet

HPSB COMPLIANCE (Updated Jan 2017)

* required entry

- ☐ Bio-Retention ☐ Dry Wells ☐ Filter Strips ☐ Grassed Swells
☐ Infiltration Trench ☐ Inlet Pollution Removal Device ☐ Permeable Pavement/Pavers ☐ Rain Barrels/Cisterns
☐ Soil Amendments ☐ Tree Box Filters ☐ Vegetated Buffers ☐ Vegetated Roof
☐ Other

Final LID Construction Cost (\$)

Post Construction Analysis (Name of DOR)

HPSB IV: Enhance Indoor Environmental Quality (UFC 1-200-02 para 2-5)

Total Points	8	Possible Points	8
Yes	HPSB IV.1	Thermal Comfort	1
Yes	HPSB IV.2	Ventilation	1
N/A	HPSB IV.3	Daylighting	1
Yes	HPSB IV.4	Moisture Control	1
Yes	HPSB IV.5	Low Emitting Materials	1
Yes	HPSB IV.6	Protect Indoor Air Quality during Construction	1
Yes	HPSB IV.7	Environmental Tobacco Smoke Control	1
Yes	HPSB IV.8	Occupant Health and Wellness	1

HPSB V: Reduce Environmental Impact of Materials (UFC 1-200-02 para 2-6)

Total Points	5	Possible Points	5
Yes	HPSB V.1	Recycled Content	1
Yes	HPSB V.2	Biologically-based Products	1
Yes	HPSB V.3	Ozone Depleting Substances	1
Yes	HPSB V.4	Waste and Materials Management - Recycling	1
Yes	HPSB V.5	Waste and Materials Management - Divert 60% from Disposal	1

Yes 60% or greater diverted

60.0% Insert percentage diverted from landfill

HPSB VI: Address Climate Change Risk (UFC 1-200-02 para 2-7)

Total Points	1	Possible Points	1
Yes	HPSB VI.1	Address Climate Change Risk	1

Possible Points 27

27 Federal Requirements - Yes or N/A

0 Federal Requirements - No

100% Percentage of Federal Requirements Met

Federal Requirements for High Performance and Sustainable Buildings (HPSB) & UFC 1-200-02

Instructions: Provide a common or project specific justification for an element to be non-applicable, when completed, the Scoresheet tab will allow an N/A response.

Justification for Non-Applicable Answers		Common Justification	Project Specific Justification	Complete?
HPSB I: Employ Integrated Design Principles (UFC 1-200-02, 2-2)				
HPSB I.1	Integrated Design			Applicable
HPSB I.2	Commissioning			Applicable
HPSB II: Optimize Energy Performance (UFC 1-200-02, 2-3)				
HPSB II.1	Energy Efficiency			Applicable
HPSB II.1	Energy Efficient Products		Roof is noted as NA as it is existing and building will not be re-roofed.	Applicable
HPSB II.2	On-site Renewable Energy		Renewables were not life cycle cost effective.	Yes
HPSB II.3	On-site Renewable Energy - Solar Hot Water Heater System		SHWH is not life cycle cost effective.	Yes
HPSB II.4	Metering			
HPSB II.4	Electric Metering: Select N/A if no service			Applicable
HPSB II.4	Natural Gas Metering: Select N/A if no service			Applicable
HPSB II.4	Steam Metering: Select N/A if no service		There is no steam to meter.	Yes
HPSB III: Protect and Conserve Water (UFC 1-200-02, 2-4)				
HPSB III.1	Indoor Water			Applicable
HPSB III.1	Indoor Water Metering: Select N/A if no service			Applicable
HPSB III.2	Outdoor Water		No existing outdoor system	Yes
HPSB III.2	Outdoor Water Metering: Select N/A if no service		Landscaping is not metered	Yes
HPSB III.3	Alternative Water		No plumbing system available for non-potable water system	Yes
HPSB III.4	Stormwater Management			
HPSB III.4	Project addressed EISA 438			Applicable
HPSB IV: Enhance Indoor Environmental Quality (UFC 1-200-02, 2-5)				
HPSB IV.1	Thermal Comfort			Applicable
HPSB IV.2	Ventilation			Applicable
HPSB IV.3	Daylighting		Majority of windows blocked or removed due to mission requirements. Areas where allowed, such as Heritage/break area and non-discussion corridors, will have windows.	Yes
HPSB IV.4	Moisture Control			Applicable
HPSB IV.5	Low Emitting Materials			Applicable
HPSB IV.6	Protect Indoor Air Quality during Construction			Applicable
HPSB IV.8	Occupant Health and Wellness			Applicable
HPSB V: Reduce Environmental Impact of Materials (UFC 1-200-02, 2-6)				
HPSB V.1	Recycled Content			Applicable
HPSB V.2	Biologically based products			Applicable
HPSB V.3	Ozone Depleting Substances			Applicable
HPSB V.4	Waste and Materials Management - Recycling			Applicable
HPSB V.5	Waste and Materials Management - Divert 60% from Disposal			Applicable
HPSB VI: Address Climate Change Riskd (UFC 1-200-02, 2-7)				
HPSB VI.1	Address Climate Change Risk			Applicable

High Performance Sustainable Building Requirements

References

Executive Order (EO) 13693, Planning for Federal Sustainability in the Next Decade

HPSB I: Employ Integrated Design Principles	
Integrated Design HPSB I.1 UFC 1-200-02 para 2-2.1	<p>Incorporate the following planning and evaluation into the integrated design, as described in ASHRAE 189.1 Informative Appendix F (Integrated Design). Follow the steps of design optimization, as applicable, in ASHRAE 189.1 Section F1.1.1 (Charrette Process).</p> <p>Use a collaborative, integrated planning and design team, composed of user, government support staff, and appropriate professionals, to identify requirements and to establish performance goals for siting, energy, water, materials, indoor environmental quality, and other comprehensive design goals. Ensure incorporation of these goals throughout the design and lifecycle of the building, including deconstruction.</p> <p>Evaluate the site and building components to determine whether passive and natural design strategies and features are cost effectively incorporated before the active and mechanical systems are designed. Incorporate these features where applicable.</p> <p>Take into account site attributes, including climate and local and regional context, which impact the design of the building.</p> <p>During the site selection process, meet the requirements of UFC 2-100-01. See Appendix B "Best Practices" for desirable site characteristics.</p> <p>During the planning and design process meet the requirements of applicable UFCs, and use the following site development considerations and passive strategies:</p> <ul style="list-style-type: none">• Site design elements that ensure safe and convenient pedestrian access.• Meet the requirements of UFC 3-201-02.• Incorporate results of site analysis, in order to design the building, focusing on orientation, configuration and massing.• Orient building to maximize energy efficiency, passive solar and daylighting potential.• Select, design and integrate into the overall building, high performance and sustainable systems (e.g., HVAC, plumbing, water heating systems, lighting systems, control systems, elevators, building envelope and fire protection systems).• Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation and active workstations.
Commissioning HPSB I.2 UFC 1-200-02 para 2-2.2	<p>In order to verify design and performance, and ensure that the Government requirements are met, employ commissioning practices appropriate to the size and complexity of the building and its system components. This must include an experienced commissioning provider, who should be independent of the project design and construction team, and the operations team. The choice of either contracted services or Government personnel to serve as the commissioning provider will be determined at project level.</p> <p>Meet the requirements of ASHRAE 189.1 Section 10.3.1.2 (Building Project Commissioning), with the following modifications:</p> <ul style="list-style-type: none">• For buildings and systems that are less complex, commissioning may be tailored as determined by the DOD Component AHJ.• "Schematic design" is the design charrette or similar conceptual design activity.• Documentation as described in ASHRAE 55 Section 6.2 is not required. <p>For Air Force projects, the Project Delivery Team must determine the level of commissioning activities required.</p>
Requirement Source Document(s)	<p>Executive Order 13693</p> <p>UFGS 01 91 00.15, Total Building Commissioning</p>

High Performance Sustainable Building Requirements**HPSB II: Optimize Energy Performance****Energy Efficiency
HPSB II.1
UFC 1-200-02 para 2-3.1****Energy Efficiency -**

Base energy efficiency design decisions on life-cycle cost as indicated in Chapter 1 of UFC 1-200-02.

Commercial and Multi-Family High-Rise Residential Buildings:

- Meet the requirements of ASHRAE 90.1. Use ASHRAE 90.1(2010) for all projects with design starts before November 6, 2016. Use ASHRAE 90.1(2013) thereafter.
- Design the building to achieve at least 30% energy consumption reduction from ASHRAE 90.1 baseline.
- If a 30% reduction is not LCCE, modify the design of the proposed building to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.
- Determine energy consumption levels for both the ASHRAE Baseline Building and proposed building by using the Performance Rating Method found in appendix G of ASHRAE 90.1, except the formula for calculating the Performance Rating.

Replace the formula in G1.2 with the following:

Percentage improvement = $100 \times ((\text{Baseline building consumption} - \text{Receptacle and process loads}) - (\text{Proposed building consumption} - \text{Receptacle and process loads})) / (\text{Baseline building consumption} - \text{Receptacle and process loads})$

Low-Rise Residential Buildings:

- Meet the requirements of International Energy Conservation Code (IECC).
- Design the building to achieve at least 30% energy consumption reduction from the IECC baseline using the Simulated Performance Alternative found in Section 405 of the IECC.
- If a 30% reduction is not LCCE, modify the design of the proposed building to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

Renovations:

- Renovation projects that replace everything above the foundation must either apply 2-3.1.1 or 2-3.1.2 as applicable.
- All other renovations choose one of the following options:
 1. Reduce measured building energy use by at least 30%, below FY 2003 energy use baseline.
 2. Reduce measured building energy use by at least 20% below FY 2015 energy use baseline.
 3. Reduce modeled energy use (from all sources including renewable energy) by 20% compared to the ASHRAE 90.1 baseline building design.
- If none of the reduction choices is life-cycle cost-effective, modify the design of the proposed building system(s) to achieve an energy consumption level at the highest level of energy efficiency that is life-cycle cost-effective.

**Energy Efficient Products
HPSB II.1
UFC 1-200-02 para 2-3.1.4****Energy Efficient Products –**

Per EISA 2007 Section 525, acquire products that are ENERGY STAR®-qualified or meet FEMP-designated efficiency requirements in all covered product categories. Select products based on life cycle cost, not initial cost. Link to EPA sites: <http://www.energystar.gov/> or <http://www1.eere.energy.gov/femp/>

Per EISA 2007 Section 524, provide commercially available, off-the-shelf products that use no more than 1 watt in their standby mode.

Requirement Source Document(s) [10 CFR 433, EPA Act 05](#)**Links** [Energy Star®](#)
[Federal Energy Management Program](#)

High Performance Sustainable Building Requirements

On-site Renewable Energy
HPSB II.2
UFC 3-440-01 para 2-3.2

Provide on-site renewable energy systems in accordance with ASHRAE 189.1 Section 7.4.1.1 (On-Site Renewable Energy Systems) and UFC 3-440-01 where LCCE, considering climate, infrastructure condition, mission compatibility, and effects on base wide electrical system (grid) power quality. Exception: Do not use purchase of renewable energy certificates (RECs) as a substitute for the Section 7.4.1.1 new building requirement.

Air Force will utilize an installation-level solution to renewable energy systems and will not require ASHRAE 189.1 Section 7.3.2 if a building-level solution is not LCCE.

Requirement Source
Document(s):

[Executive Order 13693](#)

On-Site Renewable Energy –
Solar Hot Water Heater
System
HPSB II.3
UFC 1-200-02 para 2-3.2.1

Per EISA 2007 Section 523, meet at least 30% of the annual domestic hot water requirement through the installation of solar water heating unless SDHW is not LCCE. If 30% is not LCCE, modify the design of the proposed system to achieve the highest level of solar water heating that is LCCE.

Requirement Source
Document(s):

High Performance Sustainable Building Requirements Measurement and Verification HPSB II.4 UFC 1-200-02 para 2-3.4	A utility meter must be installed at each building, for each utility serving the building (e.g., district steam, district hot and chilled water, electricity, natural gas, fuel oil, etc.) in the standard units of the measure. Meters must be connected to a base wide energy and utility monitoring and control system using the installation's advanced metering protocols. The installation of meters is required per DODI 4170.11, and as amended by DOD Utilities Meter Policy, 16 April 2013.
Requirement Source Document(s):	Federal Leadership in High Performance and Sustainable Buildings MOU
HPSB III: Protect and Conserve Water	
Indoor Water HPSB III.1 UFC 1-200-02 para 2-4.1	Indoor Water – Base water efficiency design decisions on life-cycle cost as indicated in Chapter 1 of UFC 1-200-02. <ul style="list-style-type: none"> • Meet the requirements of ASHRAE 189.1 Section 6.3.2 (Building Water Use Reduction), which incorporates USEPA WaterSense-labeled products. Water closet replacements in renovations may have a flush value of up to 1.6 GPF (6.1 LPF) to accommodate existing plumbing capacity. • Meet the requirements of ASHRAE 189.1 Section 6.4.2 (Building Water Use Reduction). • Meet the requirements of ASHRAE 189.1 Section 6.4.3 (Special Water Features).
Indoor Water Metering HPSB III.1 UFC 1-200-02 para 2-4.1.1	Indoor Water Metering -- Install advanced water meters to monitor building indoor potable water consumption, as required by DOD Utilities Meter Policy, 16 April 2013.
Requirement Source Document(s):	EPA Act 1992
Outdoor Water HPSB III.2 UFC 1-200-02 para 2-4.2	Outdoor Water -- <ul style="list-style-type: none"> • Limit potable irrigation water use by 50% compared to the conventional methods, and when LCCE, by using the methodologies in ASHRAE 189.1: Section 6.3.1 (Mandatory Provisions: Site Water Use Reduction) and either Section 6.4.1 (Prescriptive Option: Site Water Use Reduction) or Section 6.5.1 (Performance Option: Site Water Use Reduction). • For existing systems, if a building has a single water meter, reduce indoor and outdoor potable water use combined by at least 20% compared to building water use in 2007. Compare results to a baseline building, using the EPA WaterSense landscape water budget tool version 1.01 or later, or a Component approved tool. • Show preference for irrigation contractors who are certified through a WaterSense labeled program, or other industry-recognized credentialing programs. • Refer to UFC 3-201-02 for additional requirements.
Outdoor Water Metering HPSB III.2 UFC 1-200-02 para 2-4.2.1	Water metering for landscaping – When potable water is used, provide water meters for irrigation systems serving more than 25,000 square feet of landscape, when life-cycle cost-effective. Install advanced water meters to monitor outdoor potable water consumption, as required by DOD Utilities Meter Policy, 16 April 2013. For all other irrigation systems, separate water meters for locations with outdoor water use are encouraged.
Requirement Source Document(s):	Executive Order 13693
Alternative Water HPSB III.3 UFC 1-200-02 para 2-4.3 Requirement Source Document(s):	Where life-cycle cost-effective and permitted by local laws and regulations, use alternative water sources, such as harvested rainwater, treated wastewater, air handler condensate capture, grey water, and reclaimed water.

High Performance Sustainable Building Requirements**Stormwater Management
HPSB III.4
UFC 3-210-10 para 2-4.3.1**

The criteria and design standards in UFC 3-210-10 are required for the planning, design and construction of all Department of Defense (DoD) projects in the United States, United States Territories and Possessions of the United States that meet both of the following conditions:

- 1) The project includes construction or expansion of one or more buildings as part of its primary scope (i.e., primary facilities vice supporting facilities).
- 2) The "footprint" is greater than 5,000 gross square feet (464.5 square meters). "Footprint" consists of all new impervious surfaces associated with the building(s), including both building area and pavement area of associated supporting facilities (such as parking and sidewalks). "Footprint" does not include existing building area to be renovated, existing pavement area to be resurfaced, or new pavement area other than supporting facilities associated with the building(s).

For projects in the United States, United States Territories, and Possessions of the United States that do not meet the applicability requirements above, LID techniques apply to the extent practical.

**Requirement Source
Document(s):**

[EISA 2007 Sec 438](#)

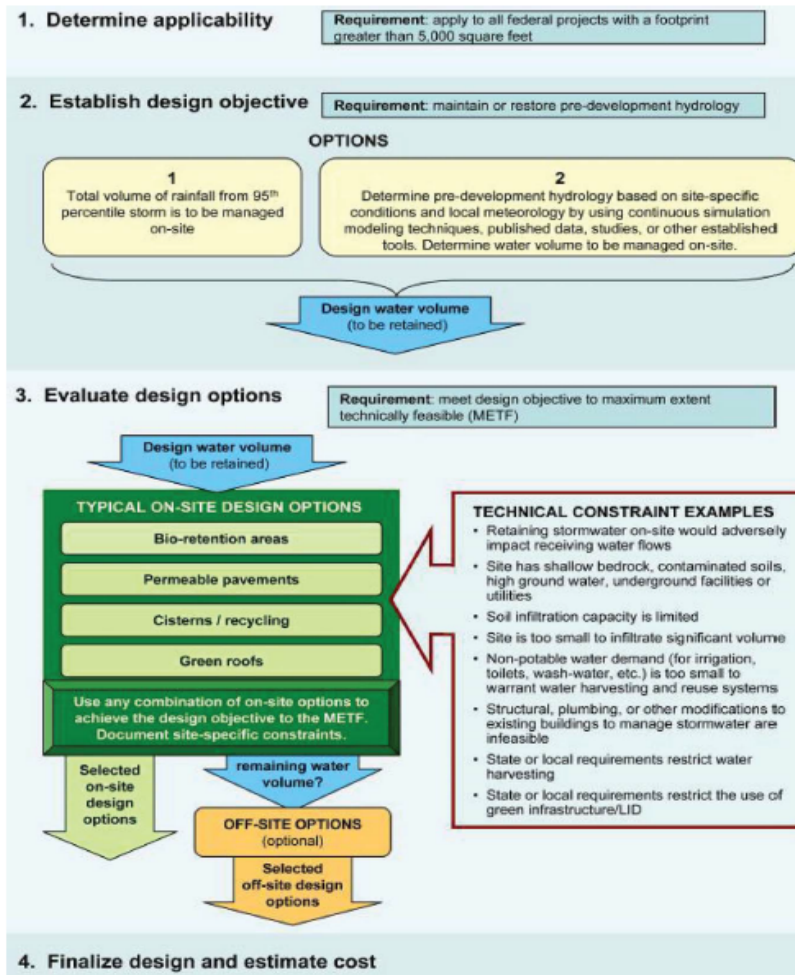
High Performance Sustainable Building Requirements	
HPSB IV: Enhance Indoor Environmental Quality	
Thermal Comfort HPSB IV.1 UFC 1-200-02 para 2-5.1	<p>Meet the requirements of ASHRAE 55. Compliance with standards by providing passive (non-mechanical) thermal comfort methods are allowed and encouraged as described in paragraph entitled, "Integrated Design" in UFC 1-200-02.</p> <p>Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for thermal comfort criteria.</p>
Requirement Source Document(s):	Executive Order 13693
Ventilation HPSB IV.2 UFC 1-200-02 para 2-5.1	<p>Meet the requirements of ASHRAE 62.1 (62.2 for low-rise residential).</p> <p>Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for ventilation criteria.</p>
Requirement Source Document(s):	Executive Order 13693
Daylighting HPSB IV.3 UFC 1-200-02 para 2-5.2	<p>All regularly occupied spaces located on the exterior wall must have vision fenestration. Where mission precludes vision fenestration for regularly occupied spaces located on the exterior wall, daylighting is still required. All classrooms and offices must have daylighting. Meet the requirements of ASHRAE 189.1 Section 8.4.1.2 (Minimum Sidelighting effective Aperture for Office Spaces and Classrooms) or Section 8.5.1.2 (Usable Daylight Illuminance in Office Spaces and Classrooms). Provide automated lighting controls in accordance with UFC 3-530-01.</p> <p>Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for additional daylighting criteria.</p>
Requirement Source Document(s):	Executive Order 13693
Moisture Control HPSB IV.4 UFC 1-200-02 para 2-5.3.1	<p>Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage, minimize mold contamination, and reduce health risks related to moisture. Meet the requirements of ASHRAE 189.1 Section 10.3.1.5 (Moisture Control), UFC 3-410-01, Chapter 3, Sections 3-2 and 3-3 (Ventilation Air), and UFC 3-101-01 Chapter 3 (Building Envelope Requirements). Refer to Appendix B "Protect Indoor Air Quality" for best practices.</p>
Requirement Source Document(s):	Executive Order 13693
Low Emitting Materials HPSB IV.5 UFC 1-200-02 para 2-5.3.2	<p>Specify materials and products with low or no pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings. Meet the requirements of ASHRAE 189.1 Section 8.4.2 (Prescriptive Option: Materials).</p> <p>Exception: Exclude compliance with 8.4.2, first sentence.</p>
Requirement Source Document(s):	Executive Order 13693
Protect Indoor Air Quality during Construction HPSB IV.6 UFC 1-200-02 para 2-5.3.3	<p>For new construction and for renovation of unoccupied existing buildings, comply with ASHRAE 189.1 Section 10.3.1.4 (Indoor Air Quality (IAQ) Construction Management), with maximum outdoor air consistent with achieving relative humidity no greater than 60%.</p> <p>For renovation of occupied existing buildings, comply with ANSI/SMACNA 008-2008, 2nd Edition, SMACNA IAQ Guidelines for Occupied Buildings Under Construction.</p>
Requirement Source Document(s):	Executive Order 13693

High Performance Sustainable Building Requirements

Environmental Tobacco Smoke Control HPSB IV.7 UFC 1-200-02 para 2-5.3.4	Prohibit smoking within the building and within a minimum of 50 feet (15.24 meters) of all building entrances, operable windows, and building ventilation intakes. Verify if more stringent facility criteria or Installation policy applies.
Requirement Source Document(s):	Federal Register: December 22, 2008 (Volume 73, Number 246) - EO 13058
Occupant Health and Wellness HPSB IV.8 UFC 1-200-02 para 2-5.4	Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation, active workstations, fitness centers, and bicycle commuter facilities. Support occupant health by considering options such as providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views. Indicate in the Integrated Design Process how these efforts were evaluated.
Requirement Source Document(s):	

High Performance Sustainable Building Requirements	
HPSB V: Reduce Environmental Impact of Materials	
Recycled Content HPSB V.1 UFC 1-200-02 para 2-6.1.1	Use RCRA Section 6002 compliant products that meet or exceed EPA's recycled content recommendations, available on EPA's Comprehensive Procurement Guideline web site at http://www.epa.gov/
Requirement Source Document(s):	RCRA 2002, Sec 6002
Biologically-based Products HPSB V.2 UFC 1-200-02 para 2-6.1.2	Per Section 9002 of the Farm Security and Rural Investment Act, specify products composed of the highest percentage of biobased content consistent with the USDA BioPreferred Program, if products meet performance requirements and are available at a reasonable cost. Exceptions taken to biobased product procurement must be documented. A preference for purchasing products with the highest biobased content per USDA recommendations for designated product categories must be included in all applicable solicitations. USDA's biobased product designations and biobased content (which includes certified sustainably-harvested and rapidly renewable resources) recommendations are available on USDA's BioPreferred web site at http://www.biopreferred.gov/
Requirement Source Document(s):	FSRIA 2002 Section 9002
Environmentally Preferable Products HPSB V.3 UFC 1-200-02 para 2-6.1.4	Meet the requirements of ASHRAE 189.1 Section 9.3.3 (Refrigerants), if equipment or systems using ozone depleting substances are included in the project. Do not use ozone depleting substances (ODS) or high Global Warming Potential (GWP) chemicals where EPAs Significant New Alternative Policy (SNAP) has identified acceptable substitutes or where other environmentally preferable products are available for use in construction, repair or end-of-life replacements: www.epa.gov/snap Exceptions: Refer to UFC 3-600-01 for fire protection system requirements.
Requirement Source Document(s):	Executive Order 13693
Waste and Materials Management - Recycling HPSB V.4 UFC 1-200-02 para 2-6.2.1	Meet the requirements of ASHRAE 189.1 Section 9.3.4.1 (Storage and Collection of Recyclables – Recyclables), where markets or onsite recycling exist.
Requirement Source Document(s):	Executive Order 13693
Waste and Materials Management, Divert 60% from Disposal HPSB V.5 UFC 1-200-02 para 2-6.2.2	Divert minimum 60% of nonhazardous construction and demolition waste material from landfills.
Requirement Source Document(s):	Executive Order 13693
	UFGS 01 74 19, Construction and Demolition Waste Management
HPSB VI: Address Climate Change Risk	
Address Climate Change Risk HPSB VI.1 UFC 1-200-02 para 2-7	Provide building design solutions responsive to any Government-provided projections of climate change projection and determination of acceptable risk. For a building located in a floodplain of concern, provide design solutions which mitigate both impact on the floodplain, and impact of the design flood event on building function and occupants, consistent with mission criticality.

Figure 2-1 Implementation of EISA Section 438



AF Sustainable Building Requirements Legend	
Gray Text	Recommended (Federal Requirement not fully defined at this time)
Light Gray Cell	Cell is populated by other cells. User is not required to enter values.
Light Green Cell (When used, conditional formatting changes cell to Green or Red depending on entry)	Cell provides a drop-down box for the user to select which LEED Credits and HPSB Requirements that the project is attempting. When a "Yes" or "No" is selected the cell follows the stoplight convention to visually represent progress. The stoplight convention is also used for "Yes" or "No" totals. Some light green boxes also have an option for "N/A" when used for subquestions
	Cell uses a drop down box and user is designating "Yes" or "N/A" when applicable
	Cell uses a drop down box and user is designating "No"
Light Yellow Cell	Cell is for custom entry on how the project is pursuing HPSB requirements. These are subquestions and also general information questions. Boxes that appear when cell is selected give further instruction on entering data. Some cells restrict values that can be entered - which is explained if incorrectly entered

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

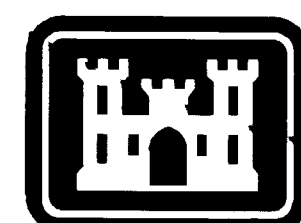
GRAND FORKS AFB, ND

APPENDIX C AS-BUILT DRAWINGS



**US Army Corps
of Engineers** ®
Omaha District

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**US Army Corps
of Engineers**

Kansas City District
You Matter - We Care

SQUADRON OPERATIONS/ AMU

Grand Forks AFB, North Dakota

February 1997

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

PN JFFD963501 FY 97
CONTRACT # DACA41-97-C-0020

DRAWING HOTLINKS
GENERAL
BLDG 665 & 667
CIVIL
LANDSCAPING
ARCHITECTURAL
STRUCTURAL
MECHANICAL
TEMPERATURE CONTROLS
PLUMBING
ELECTRICAL
GEOTECHNICAL

63-00- 156-1 T-1

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AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

SIGNATURES AFFIXED BELOW INDICATE OFFICIAL RECOMMENDATION AND APPROVAL OF DRAWINGS IN THIS SET AS INDEXED ON THIS SHEET

APPROVAL RECOMMENDED:

CHEF, DESIGN BRANCH

APPROVED:

CHEF, ENGINEERING & PLANNING DIVISION

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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K. GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	R.A.C. INDEX		
Checked by:	W.R.K. Scale: AS SHOWN Sheet numbers: Plot Scale: 8:1		
Submitted by:	R.M.A. Date: FEBRUARY 1997 Design File: T-2 File No.: AF 141-753-01		

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AS-BUILT DRAWINGS

APRIL 2000
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Revisions			
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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
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631-000-156-3 T-3

5

4

3

2

1

CIVIL LEGEND

FUTURE	EXISTING	NEW	
-----	=====	=====	BUILDINGS
-----	=====	=====	ROADS
-----	=====	=====	CURB & GUTTER
-----	=====	=====	WALKS
---22---	---12---	---772---	CONTOURS
-----	-----	-----	SPOT GRADE ELEVATIONS
-----	-----	-----	DIRECTION OF DRAINAGE
-----	-----	-----	CULVERT
-----	-----	-----	STORM DRAIN
-----	-----	-----	SUBDRAIN
-----	-----	-----	SUBDRAIN OUTLET LINE
-----	-----	-----	WATERLINE
-----	-----	-----	SANITARY SEWER
-----	-----	-----	WASTE DRAIN
-----	-----	-----	SUBDRAIN FLUSHING & OBSERVATION RISER
-----	-----	-----	MANHOLE SELF EXPLANATORY DEPENDING ON TYPE OF UTILITY LINE
-----	-----	-----	CURB INLET
-----	-----	-----	AREA INLET
-----	-----	-----	FIRE HYDRANT
-----	-----	-----	GATE VALVE & VALVE BOX OR SERVICE STOP & BOX
-----	-----	-----	RAILROAD
-----	-----	-----	DRILL HOLE
-----	-----	-----	POST INDICATOR VALVE
-----	-----	-----	PROPERTY LINE MONUMENT
-----	-----	-----	UNDERGROUND STEAM SUPPLY
-----	-----	-----	FIRE PROTECTION WATERLINE
-----	-----	-----	GAS
-----	-----	-----	GAS MAIN
-----	-----	-----	GAS METER

ARCHITECTURAL LEGEND

-----	EXISTING EARTH
-----	FILL EARTH
-----	CONCRETE
-----	CRUSHED ROCK
-----	GRAVEL
-----	CONCRETE MASONRY UNITS (PLAN)
-----	CONCRETE MASONRY UNITS (SECTION)
-----	GLAZED STRUCTURAL UNITS
-----	CERAMIC TILE
-----	QUARRY TILE
-----	BRICK
-----	WOOD (ROUGH)
-----	WOOD (FINISH)
-----	BLANKET INSULATION
-----	PERIMETER INSULATION
-----	GYPHUM WALLBOARD
-----	PLASTER
-----	RIGID INSULATION
-----	METAL FLASHING
-----	COMPOSITION MASTIC
-----	FILL INSULATION
-----	GLASS
-----	WOOD STUD PARTITION
-----	METAL STUD PARTITION
-----	METAL

MECHANICAL LEGEND

HEATING	
---HWS---	HOT WATER HEATING SUPPLY
---HWR---	HOT WATER HEATING RETURN

PLUMBING	
---	(CW) COLD WATER
---	(HW) HOT WATER
---	HOT WATER RETURN
---	(W) WASTE
---	(V) VENT
---	HOSE BIBB
---	WALL HYDRANT
---	CLEAN OUT
---	FINISHED FLOOR CLEAN OUT
---	FLOOR DRAIN

REFRIGERATION	
---CWS---	CHILLED WATER SUPPLY
---CWR---	CHILLED WATER RETURN

MISCELLANEOUS PIPING	
---G---	NATURAL GAS
---FP---	FIRE PROTECTION

EQUIPMENT LEGEND

-----	AHU	AIR HANDLER UNIT
-----	CUH	PACKAGED CHILLER
-----	PUH	CABINET UNIT HEATER
-----	VAV	PROPELLER UNIT HEATER
-----	P	VARIABLE AIR VOLUME TERMINAL UNIT
-----	EF	PUMP
-----	ET	EXHAUST FAN
-----	ET	BOILER
-----	ET	EXPANSION TANK
-----	ET	DOMESTIC WATER HEATER
-----	FP	FIRE PUMP
-----	HU	HUMIDIFIER
-----	RCP	RADIANT CEILING PANEL
-----	FT	FINNED TUBE RADIATOR

① THERMOSTAT - SEE TEMPERATURE CONTROL DRAWINGS

FAN POWERED VARIABLE AIR VOLUME TERMINAL UNIT

VARIABLE AIR VOLUME TERMINAL UNIT

VALVES AND FITTINGS

-----	GLOBE VALVE
-----	GATE VALVE
-----	SWING CHECK VALVE
-----	HOSE GATE VALVE
-----	PLUG VALVE
-----	NEEDLE VALVE
-----	STRAINER
-----	RELIEF VALVE
-----	MOTOR OPERATED VALVE
-----	TEMPERATURE REGULATING VALVE
-----	SOLENOID VALVE
-----	PRESSURE REDUCING VALVE
-----	FLOAT VALVE
-----	ANCHOR
-----	EXPANSION JOINT
-----	ELBOW DOWN
-----	ELBOW UP
-----	TEE DOWN
-----	TEE UP
-----	CAP
-----	UNION
-----	CALIBRATED BALANCE VALVE
-----	AUTO FLOW VALVE WITH STRAINER
-----	BALL VALVE
-----	REDUCING OR INCREASING FITTING

THERMOMETER AND WELL

HVAC

-----	12"Ø	ROUND DUCTWORK WITH DIAMETER, INCHES
-----	48"x26"Ø	OVAl DUCTWORK WITH MAJOR AND MINOR DIMENSIONS, 1ST DIMENSION = PLAN DIMENSION, INCHES
-----	14"x12"	RECTANGULAR DUCTWORK WITH DIMENSIONS, 1ST DIMENSION = PLAN DIMENSION, INCHES
-----	-----	DUCTWORK WITH DUCT LINING, SIZE SHOWN IS INTERIOR CLEAR DIMENSION, CONTRACTOR SHALL INCREASE SHEET METAL SIZE TO ACCOMMODATE LINING.
-----	-----	WATERTIGHT DUCT, SEE SPECS. FOR CONSTRUCTION.
-----	BOD: 11' - 5"	SHEET METAL DUCT SHOWING BOTTOM ELEVATION OF DUCT ABOVE FINISHED FLOOR.
-----	UP	CHANGE IN DIRECTION (SLOPE) IN DUCT.
-----	-----	CHANGE OF DIRECTION (ELBOWS) IN SUPPLY DUCT.
-----	-----	CHANGE OF DIRECTION (ELBOWS) IN EXHAUST/RETURN DUCT.
-----	-----	DUCT TAKE-OFF WITH VOLUME DAMPER.
-----	-----	SPLITTER DAMPER AND TURNING VANES IN DUCT BRANCH-OFF.

-----	FLEXIBLE DUCT RUNOUT WITH VOLUME DAMPER.
-----	CEILING SUPPLY DIFFUSERS
-----	RETURN GRILLE SIZE.
-----	EXHAUST REGISTER - CFM AND SIZE.
-----	FIRE DAMPER
-----	SUPPLY REGISTER

INTERIOR ELECTRICAL LEGEND

SEE SHEET E-0 FOR LEGEND

EXTERIOR ELECTRICAL LEGEND

SEE SHEET E-0 FOR LEGEND

FENCES

-----	EXISTING
X	CHAIN LINK SECURITY

SYMBOL IDENTIFICATION

-----	2	DETAIL NUMBER
-----	A2/A5	SHEET NUMBER OF DWG. WHERE DETAIL IS SHOWN
-----	A	EXTERIOR VIEW LETTER
-----	A2/A5	SHEET NUMBER OF DWG. WHERE VIEW IS SHOWN
-----	3	INTERIOR VIEW NUMBER
-----	A2/A5	SHEET NUMBER OF DWG. WHERE VIEW IS SHOWN
-----	B	SECTION LETTER
-----	A2/A5	SHEET NUMBER OF DWG. WHERE SECTION IS TAKEN
-----	4	PARTITION NO.
-----	A2/A5	SHEET NO. WHERE SHOWN
-----	123	DOOR NO.
-----	102	ROOM & AREA NO.
-----	A	WINDOW TYPE
-----	A	LOUVER TYPE

MODULAR MEASURE

1. A HORIZONTAL AND VERTICAL GRID OF REFERENCE LINES SPACED 4" APART IN LENGTH, WIDTH AND HEIGHT IS USED ON MASONRY BUILDINGS.
2. GRID LINES ARE SHOWN ONLY ON LARGE SCALE SECTIONS AND DETAILS OF THE MASONRY CONSTRUCTION.
3. NOMINAL DIMENSIONS ARE INDICATED BY ARROWS TO THE GRID LINE.
4. ACTUAL DIMENSIONS ARE INDICATED BY DOTS OFF THE GRID LINE.


GENERAL NOTES

1. THESE LEGENDS ARE COMPOSED OF STANDARD SYMBOLS AND ARE PERTINENT TO THE CONDITIONS ON THIS SET OF DRAWINGS TO THE EXTENT APPLICABLE.
2. ADDITIONAL LEGENDS AND/OR ANOTHER LEGEND SHEET MAY APPEAR IN THIS SET OF DRAWINGS TO INDICATE SPECIFIC CONDITIONS IN LIEU OF SYMBOLS SHOWN ON THIS SHEET.
3. EXISTING FACILITIES TO BE REMOVED ARE INDICATED BY USE OF THESE SYMBOLS AND HACHURED THUS: AND NOTED "TO BE REMOVED".

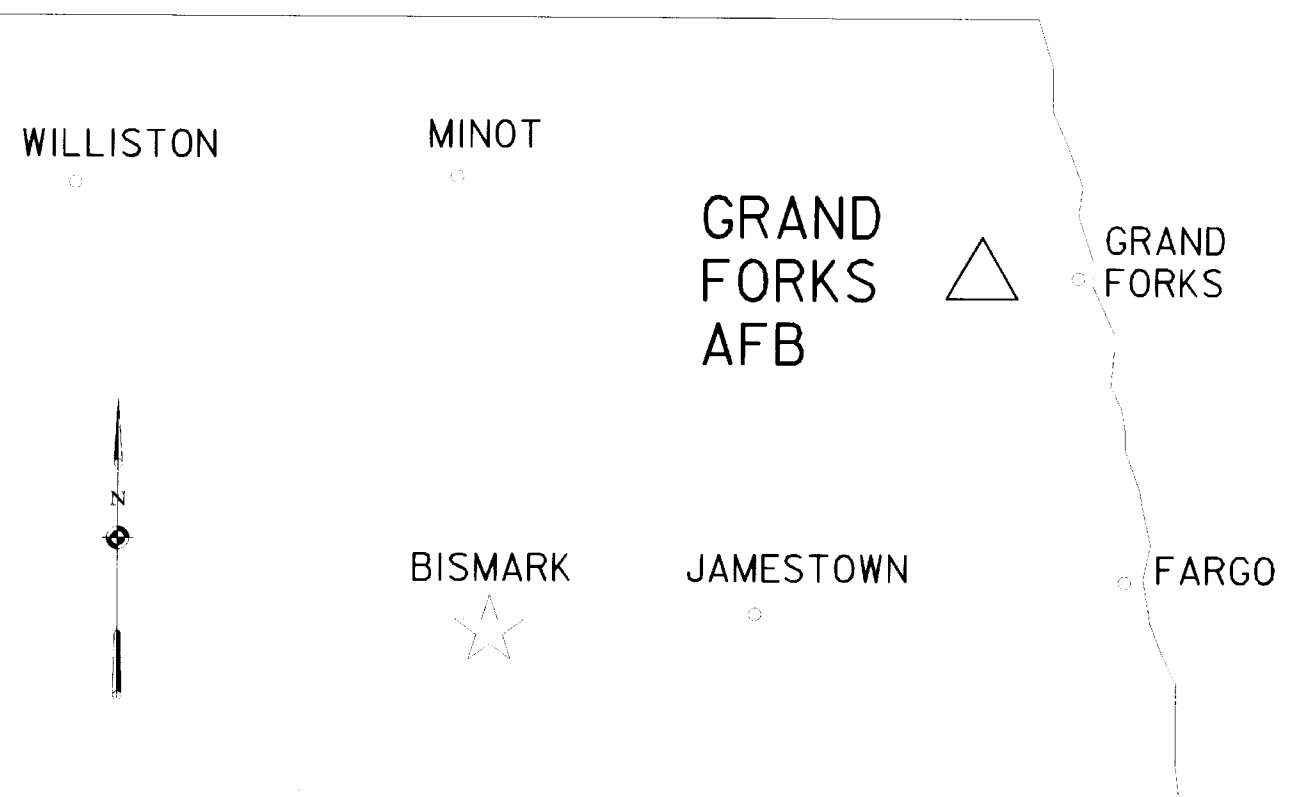
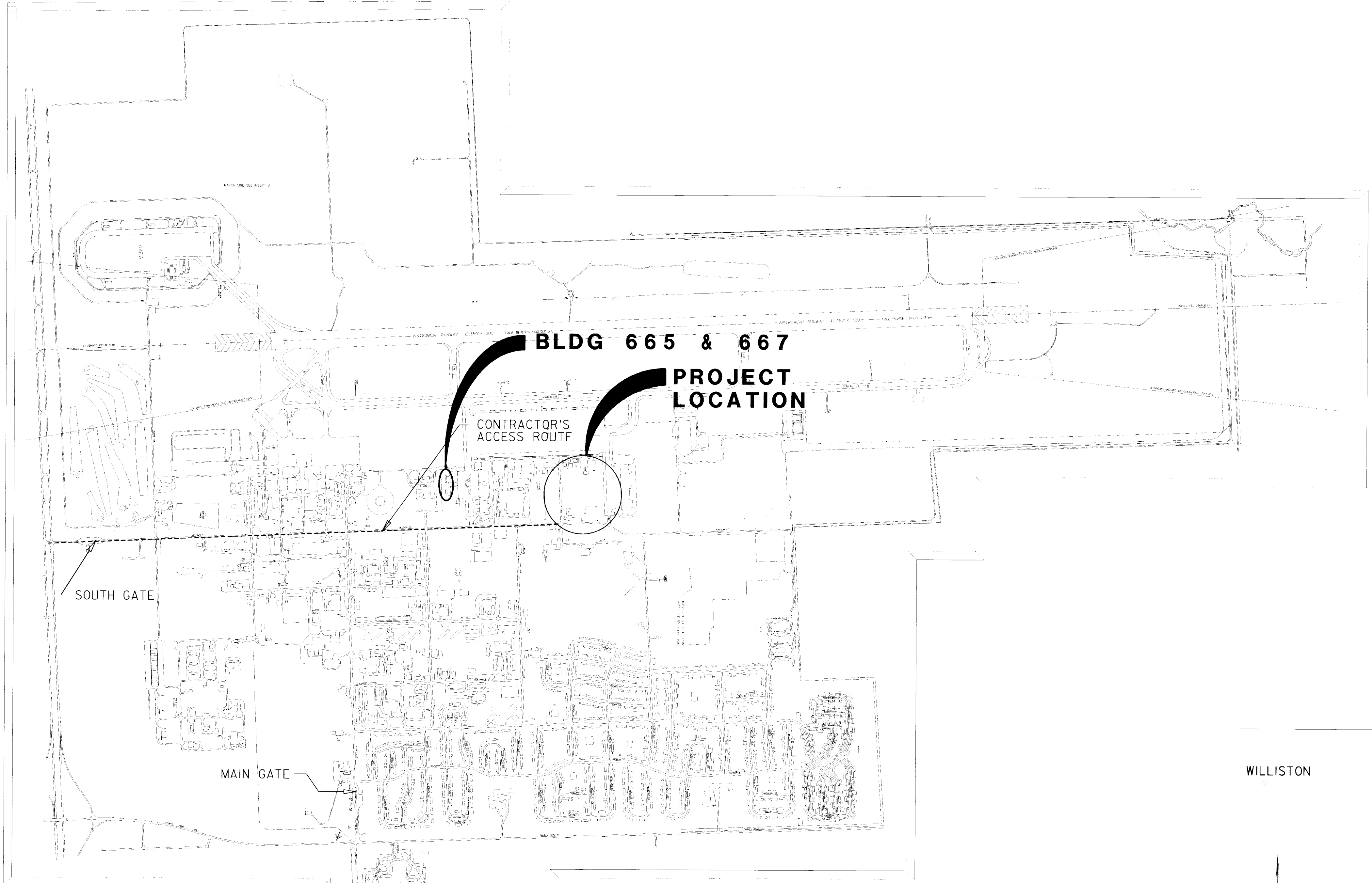
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
-----	REVISED FOR "AS-BUILT" CONDITIONS	04/00	-----
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	Grand Forks AFB PROJECT NO. JFSD963501, FY97 SQUADRON OPERATIONS/AMU	NORTH DAKOTA
Drawn by:	R.A.C.	LEGEND	
Checked by:	W.R.K.	Scale: NO SCALE	Sheet number: 8 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: G501T004.2D
		Dwg. No.: AF 141-753-01	File No.: T-4

Revisions				
Symbol	Descriptions	Date	Approved	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00		
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Designed by:	 <p align="center"> GRAND FORKS AFB PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU </p>	NORTH DAKOTA		
W.R.K.				
Drawn by:				
R.A.C.				
Checked by:	<p align="center">ABBREVIATIONS</p>			
W.R.K.				
Submitted by:	Scale: NO SCALE Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Sheet number: T-5	Plot Scale: 8 : 1 Design Files: G501T005.2D File No.:	
R.M.A.				

VALUE ENGINEERING PAYS



STATE OF NORTH DAKOTA
VICINITY MAP

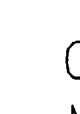
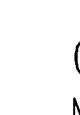
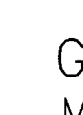
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AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

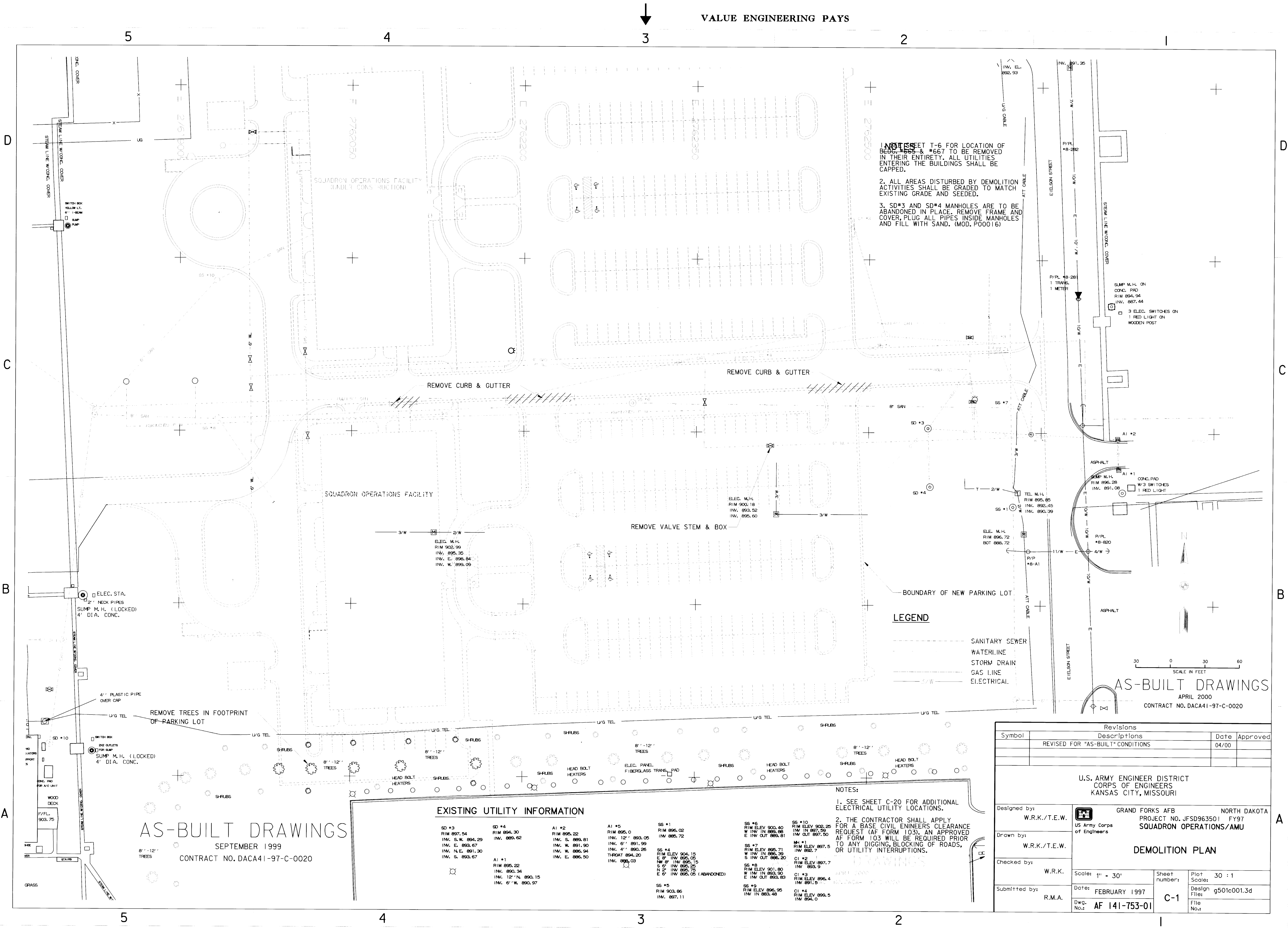
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	R.A.C.		
Checked by:	W.R.K.		
Submitted by:	R.M.A.		
Scale:	NO SCALE	Sheet number:	Plot Scale: 8:1
Date:	FEBRUARY 1997	Design File:	G501T006.3D
Dwg. No.:	AF 141-753-01	T-6	File No.:

631-000-156-6 T-6



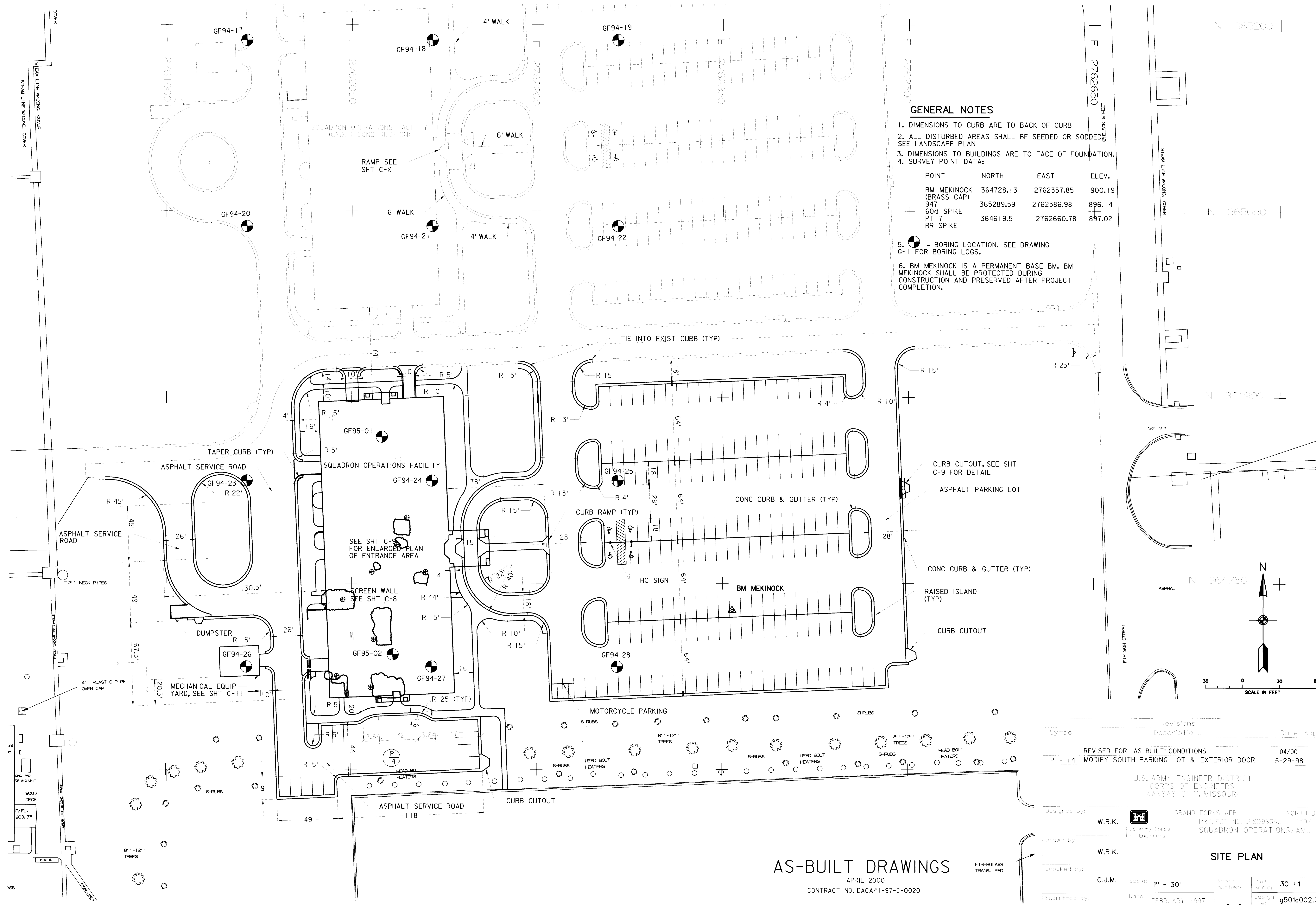
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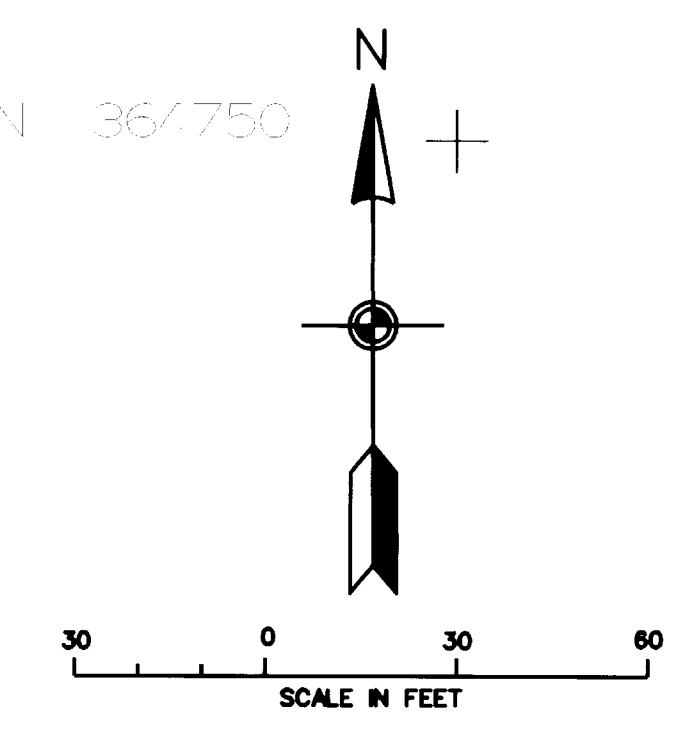
631-00- 156-7 C-1

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K./T.E.W.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	W.R.K./T.E.W.	US Army Corps of Engineers	
Checked by:	W.R.K.	Scale: 1" = 30'	Sheet number: 30 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g501c001.3d
		Dwg. No.: AF 141-753-01	File No.:



GENERAL NOTES

1. DIMENSIONS TO CURB ARE TO BACK OF CURB
 2. ALL DISTURBED AREAS SHALL BE SEEDED OR SODDED SEE LANDSCAPE PLAN
 3. DIMENSIONS TO BUILDINGS ARE TO FACE OF FOUNDATION.
 4. SURVEY POINT DATA:
- | POINT | NORTH | EAST | ELEV. |
|-------------------------|-----------|------------|--------|
| BM MEKINOCK (BRASS CAP) | 364728.13 | 2762357.85 | 900.19 |
| 947 | 365289.59 | 2762386.98 | 896.14 |
| 60d SPIKE | 364619.51 | 2762660.78 | 897.02 |
| RR SPIKE | | | |
5. = BORING LOCATION. SEE DRAWING G-1 FOR BORING LOGS.
 6. BM MEKINOCK IS A PERMANENT BASE BM. BM MEKINOCK SHALL BE PROTECTED DURING CONSTRUCTION AND PRESERVED AFTER PROJECT COMPLETION.



AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions		Date	
Symbol	Descriptions	Approved	
P - 14	REVISED FOR "AS-BUILT" CONDITIONS MODIFY SOUTH PARKING LOT & EXTERIOR DOOR	04/00 5-29-98	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	Grand Forks AFB US Army Corps of Engineers	NORTH DAKOTA 1997 SQUADRON OPERATIONS/AMU
Drawn by:	W.R.K.	SITE PLAN	
Checked by:	C.J.M.	Scale: 1" = 30'	Sheet number: 30 of 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design Title: g501c002.3d
		Drawn: 4/5/01	File No:

631-00- 156-8 C-2

VALUE ENGINEERING PAYS

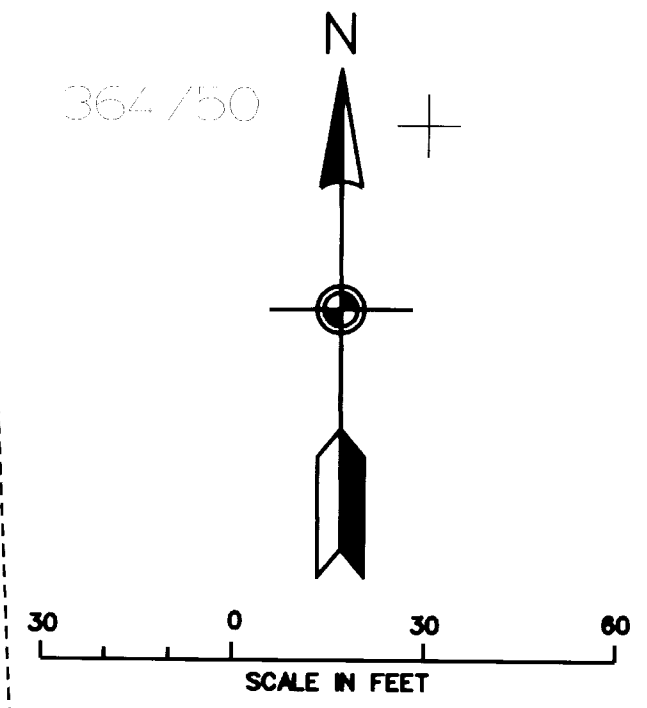
INV. EL.
892.93

GENERAL NOTES

1. UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN LOCATED FROM AVAILABLE SURVEYS AND RECORDS. THE LOCATIONS OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. UTILITIES WHICH ARE NOT SHOWN AND WHICH ARE DISCOVERED DURING CONSTRUCTION SHALL BE REPORTED TO THE CONTRACTING OFFICER.
2. ALL AREAS DISTURBED BY CONSTRUCTION AND NOT OTHERWISE SURFACED SHALL BE SEEDED OR SODDED AS SHOWN ON THE LANDSCAPE PLANS.
3. SEE SHEET C-1 FOR STORM SEWER INFORMATION.
4. NOT ALL UTILITIES SHOWN ON THIS SHEET. SEE SHT C-13 AND C-20 FOR ADDITIONAL UTILITY LOCATIONS.

LEGEND

- 900 — EXIST CONTOURS
- 900 — FINISH CONTOURS
- EXIST. STORM DRAIN
- + (901.00) SPOT ELEVATIONS
- AI-1 AREA INLET
- 12" Ø SD NEW STORM DRAIN



AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DAC41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	REVISED FOR "AS-BUILT" CONDITIONS MODIFY SOUTH PARKING LOT & ADD EXTERIOR DOOR	04/00 5-29-98	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	W.R.K.	GRADING PLAN	
Checked by:	C.J.M.	Scale: 1" = 30'	Sheet number: 14
Submitted by:	R.M.A.	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Plot Scale: 30 : 1 Design File: g501c003.3d File No.:

63100- 156-9 C-3

VALUE ENGINEERING PAYS

GENERAL NOTES

1. THE CONTRACTOR SHALL DELINEATE THE LIMITS OF THE CONTRACTOR WORK AREA BY INSTALLING A BOUNDARY FENCE. THE FENCE SHALL BE ORANGE SAFETY BARRICADE OR APPROVED EQUIV.
2. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL BURIED AND ABOVE GROUND UTILITIES, AND VERIFY ANY CONFLICTS WITH PROPOSED CONSTRUCTION. ALL CONFLICTS SHALL BE COORDINATED WITH THE CONTRACTING OFFICER.
3. THE LOCATION OF TRAILERS AND THE STORAGE OF MATERIALS SHALL BE AS DIRECTED BY THE CONTRACTING OFFICER. MATERIALS AND TRAILERS WILL NOT BE LOCATED NEAR EIELSON STREET.
4. THE LIMITS OF THE CONTRACTOR WORK AREA REPRESENT THE WORK LIMITS REQUIRED FOR CONSTRUCTION OF THE BUILDING AND IMMEDIATE SITE WORK. ADDITIONAL WORK MAY BE REQUIRED OUTSIDE OF THESE LIMITS FOR THE PURPOSE OF UTILITY EXTENSIONS, ROAD RECONSTRUCTION, OR GRADING, ETC. IN ORDER TO PERFORM THIS ADDITIONAL WORK THE CONTRACTOR SHALL EXPAND THESE LIMITS THRU THE USE OF A SAFETY BARRICADE. UPON COMPLETION OF THIS WORK, THE LIMITS OF THE CONTRACTOR WORK AREA SHALL BE REDUCED TO THE AREA SHOWN ON THIS DRAWING.
5. PAVEMENT CENTERLINE MARKINGS SHOWN ON THIS SHEET SHALL BE 4" WIDE, BROKEN, YELLOW LINES. SEE SHEET C-10 FOR PAVEMENT MARKINGS. SEE SHEET C-12 FOR PARKING STRIPING INFORMATION.
6. SEE SHEET C-10 FOR SIDEWALK JOINT DETAILS.
7. [] DESIGNATES THE LIMITS OF PARKING LOT PAVEMENT SEE SHEET C-8 FOR PARKING LOT PAVEMENT SECTION.
8. 4' X 4' X 6" EXTERIOR CONC DOOR PAD. SEE SHT C-10.
9. EDGE OF SIDEWALK SHALL EXTEND 4" BEYOND DOOR OPENING AT PERSONNEL DOOR LOCATIONS.

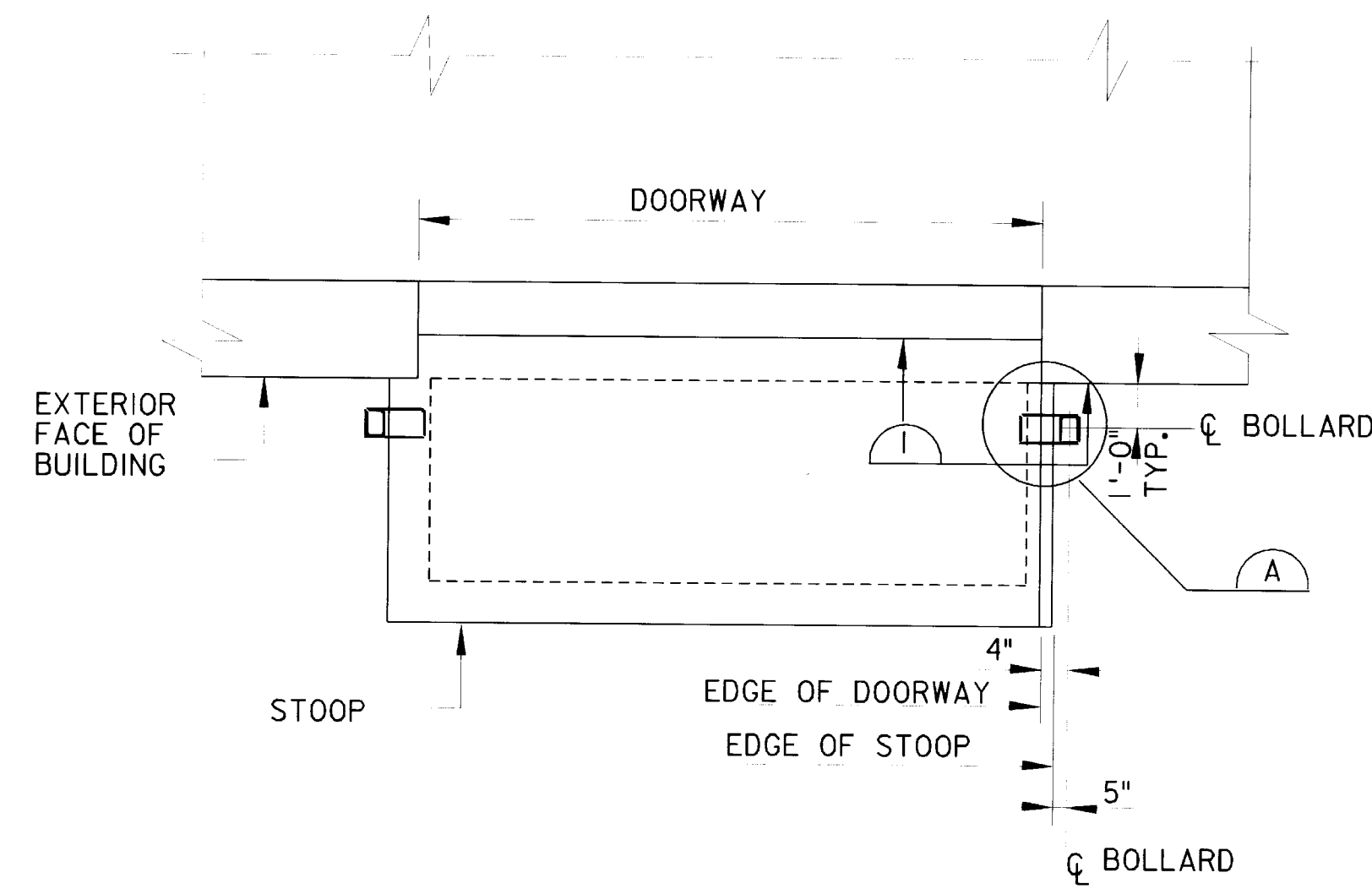
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

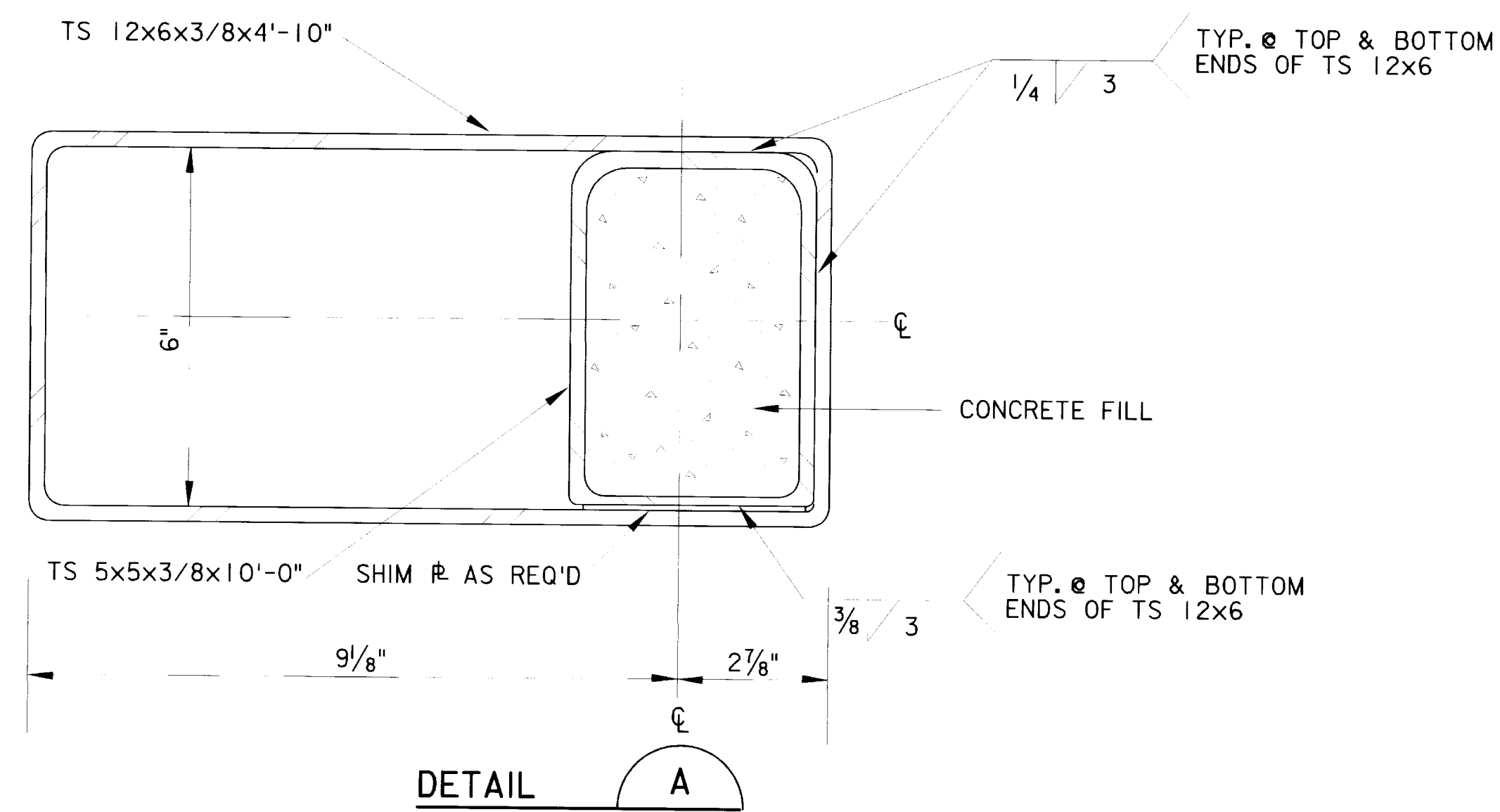
Revisions			
Symbol	Descriptions	Date	Approved
	MODIFY SOUTH PARKING LOT & ADD EXTERIOR DOOR	5-29-98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: W.R.K.	GRAND FORKS AFB PROJECT NO. JFSD963501 NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU		
Drawn by: W.R.K.	STRIPING AND JOINT LAYOUT PLAN		
Checked by: C.J.M.	Scale: 1" = 30'	Sheet number: C-4	Plot Scale: 30 : 1
Submitted by: R.M.A.	Date: FEBRUARY 1997	Design File: g501c004.3d	File No.:
	Dwg. No.: AF 141-753-01		

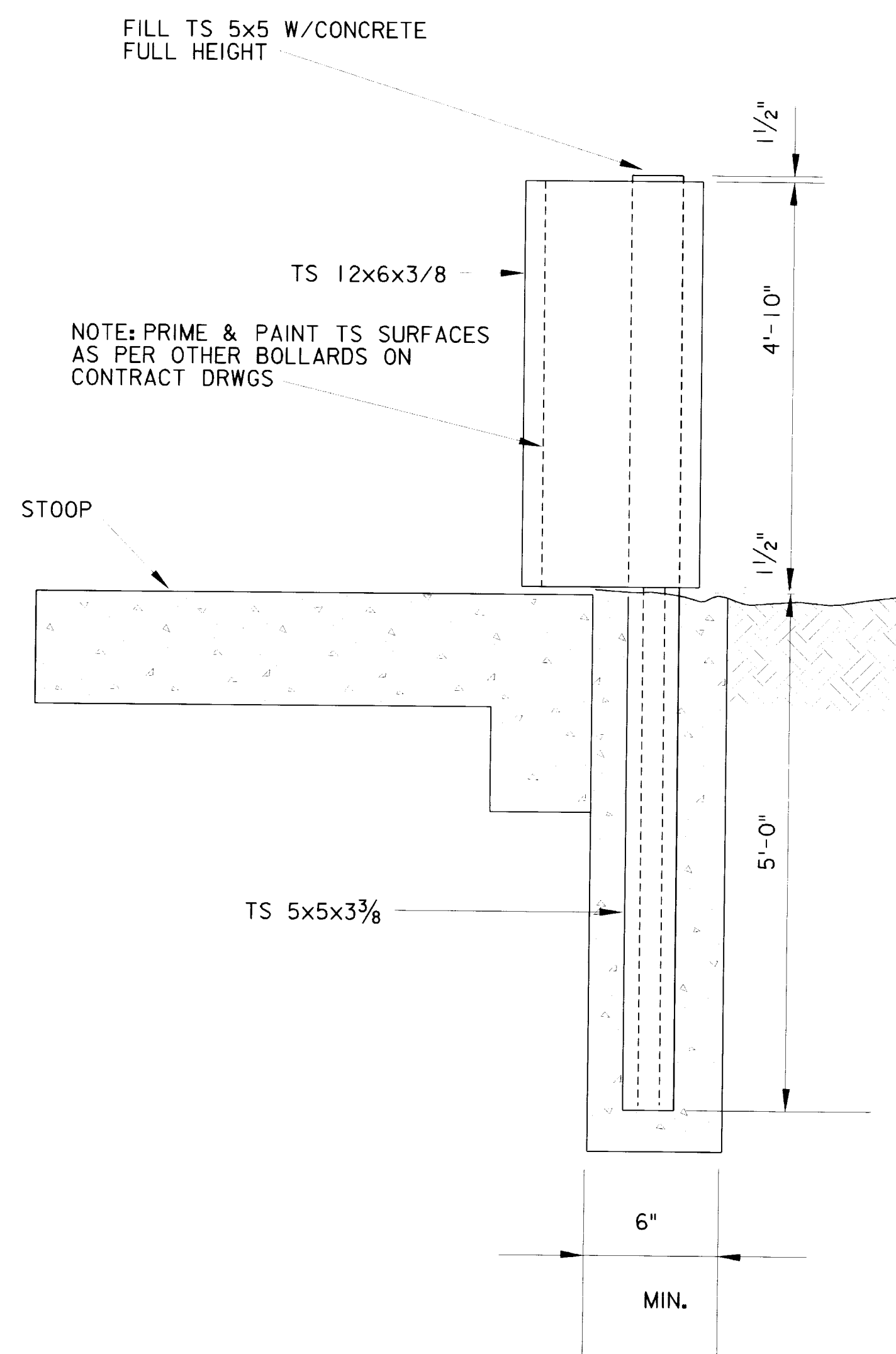
63-000 156-10 C-4



PARTIAL PLAN @ DOORWAY
NOT TO SCALE



BOLLARD PLAN FOR OVERHEAD DOORS WITH NARROW STOOPS
NOT TO SCALE

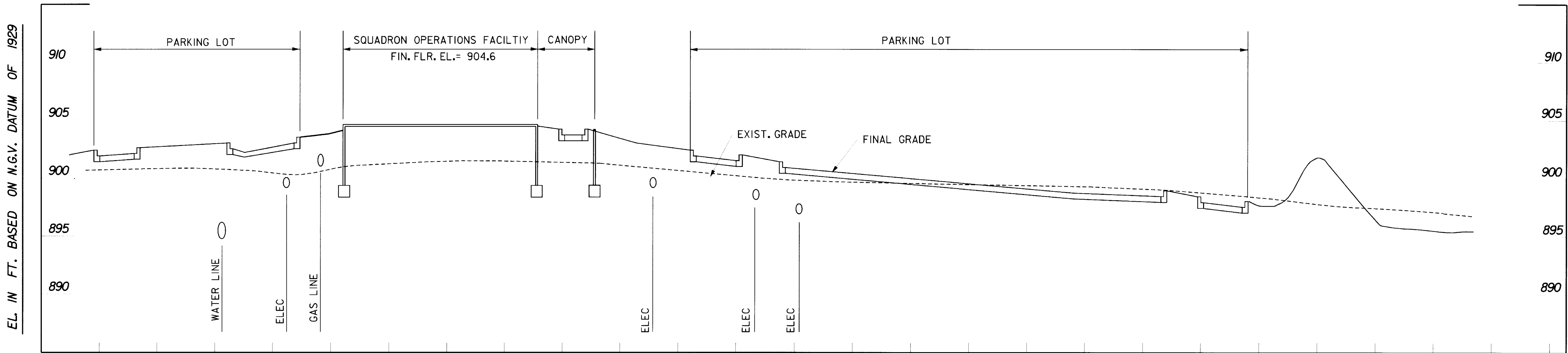


EXTERIOR BOLLARD SECTION I
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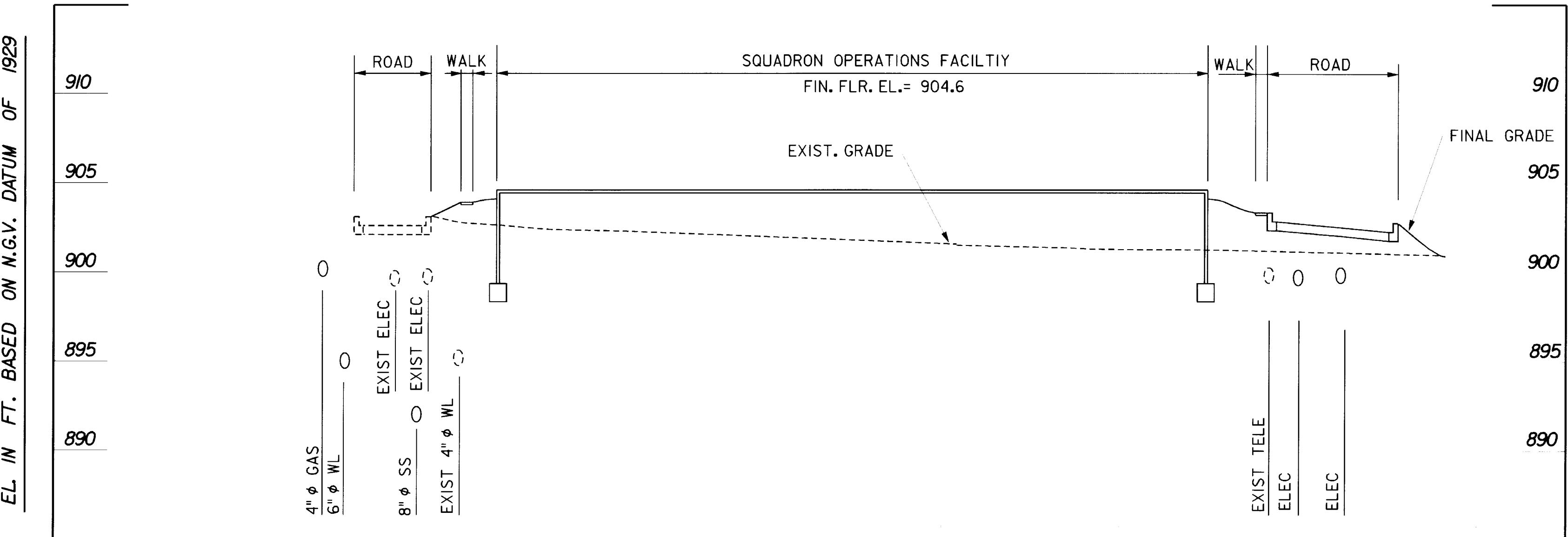
AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	J.S.		
Checked by:			
Submitted by:			
Scale:	AS SHOWN	Sheet number:	Plot Scale: 8:1
Date:	FEBRUARY 1997	Design File:	g501c04a.3d
Dwg. No.:	AF 141-753-01	File No.:	

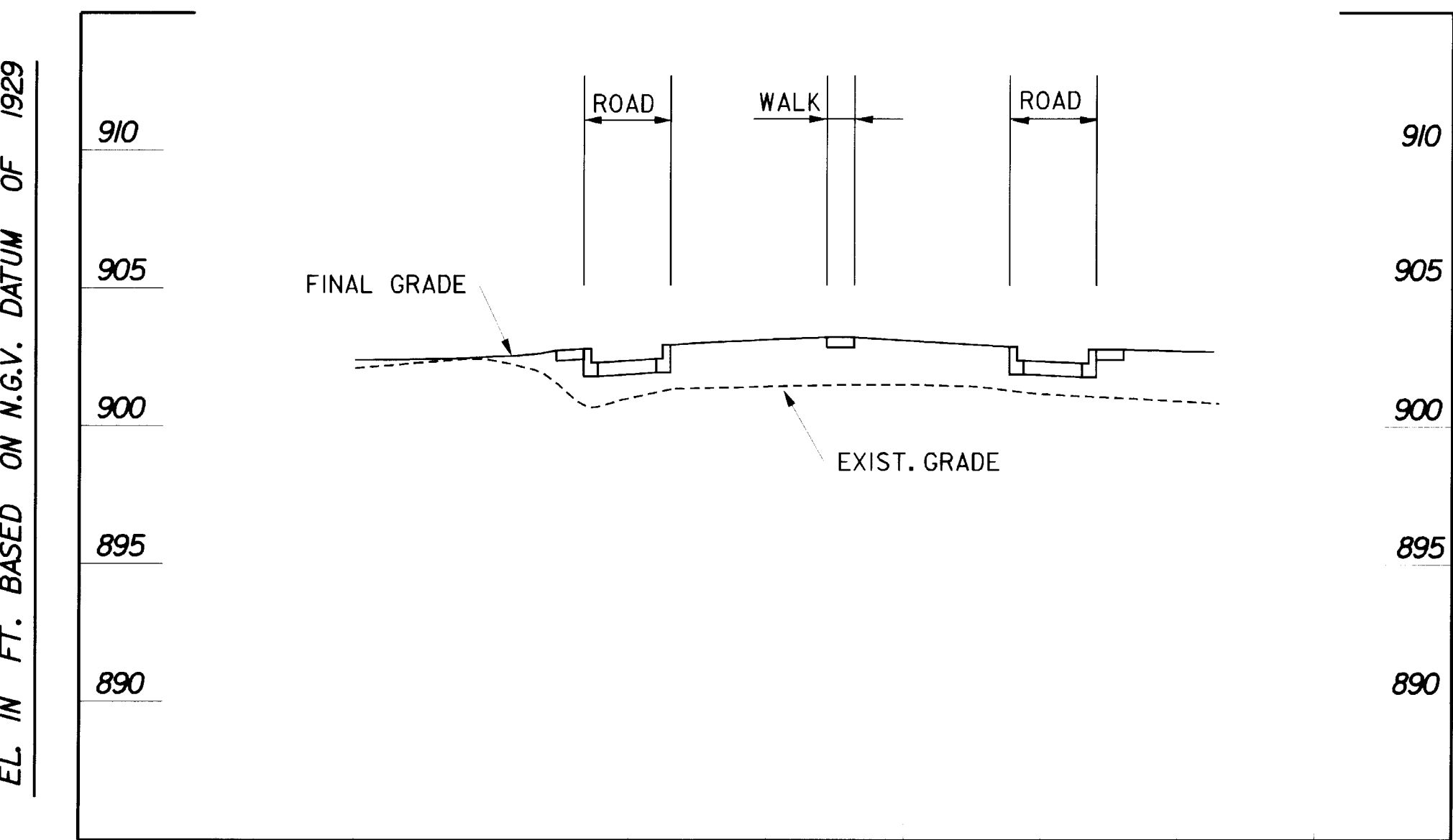
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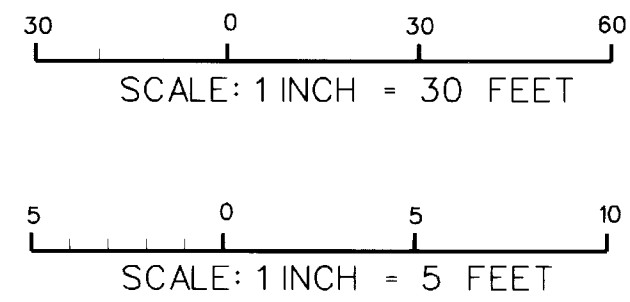
A SECTION
C-3 | C-5 SCALE: 1" = 30'-0" HORIZ.
1" = 5'-0" VERT.



B SECTION
C-3 | C-5 SCALE: 1" = 30'-0" HORIZ.
1" = 5'-0" VERT.



C SECTION
C-3 | C-5 SCALE: 1" = 30'-0" HORIZ.
1" = 5'-0" VERT.



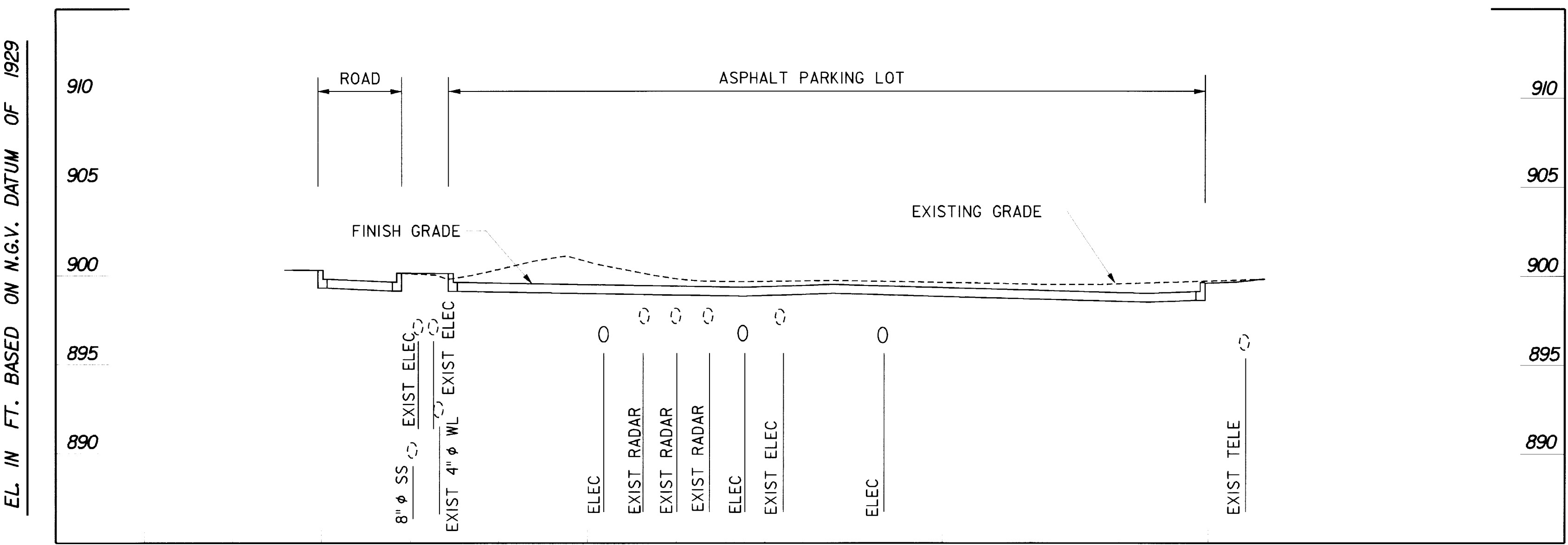
- NOTES
1. ELEVATIONS OF UTILITIES ARE GIVEN TO THE EXTENT OF INFORMATION AVAILABLE. EXISTING UTILITIES WHICH ARE BEING TIED INTO SHALL HAVE ALL ELEVATIONS & DIMENSIONS FIELD VERIFIED.
 2. SEE SHEET C-20 FOR ELECTRICAL UTILITY LINES.
 3. WHEN UNIDENTIFIED LINES ARE EXPOSED OR DAMAGED, THEY SHALL BE IMMEDIATELY REPORTED TO THE CONTRACTING OFFICER.

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	W.R.K.	SECTION CUTS	
Checked by:	C.J.M.	Scale: 1"=30'-0"	Sheet number: 30:1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: G501C005.2D
	Dwg. No.: AF 141-753-01	C-5	File No.:

631-000- 156-12 C-5

VALUE ENGINEERING PAYS



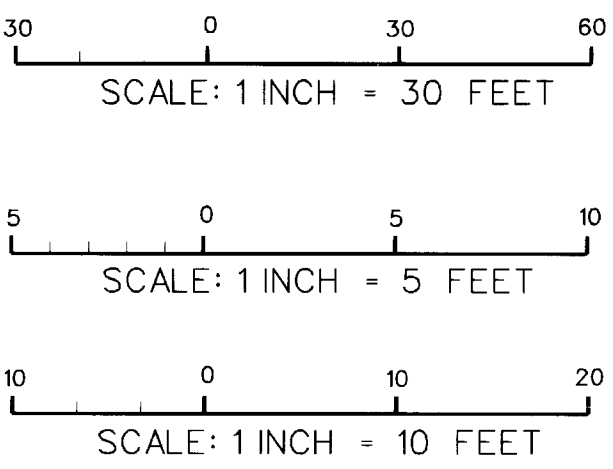
D SECTION
C-3 | C-6 SCALE: 1" = 30'-0" HORIZ.
1" = 5'-0" VERT.

- NOTES
1. ELEVATIONS OF UTILITIES ARE GIVEN TO THE EXTENT OF INFORMATION AVAILABLE. EXISTING UTILITIES WHICH ARE BEING TIED INTO SHALL HAVE ALL ELEVATIONS & DIMENSIONS FIELD VERIFIED.
 2. SEE SHEET C-20 FOR ELECTRICAL UTILITY LINES.
 3. WHEN UNIDENTIFIED LINES ARE EXPOSED OR DAMAGED, THEY SHALL BE IMMEDIATELY REPORTED TO THE CONTRACTING OFFICER.
 4. CONSTRUCTION OF THE NEW STORM DRAIN LINE SHALL NOT DISTURB EXISTING UTILITIES INCLUDING AT&T LINES, SEWER, AND ELECTRICAL LINES. THE EXACT DEPTH OF BURY FOR THE AT&T AND ELECTRICAL UTILITIES IS NOT KNOWN AND SHALL BE VERIFIED BY THE CONTRACTOR. MAINTAIN ADEQUATE COVER FOR THESE UTILITIES.
 5. EXISTING DEPTH OF COVER OVER EXISTING ELECTRICAL, TELEPHONE, & RADAR UTILITY LINES IS UNKNOWN. SEE SPEC. FOR PROPER DEPTH OF COVER TO BE MAINTAINED OVER THESE UTILITY LINES IN AREAS WHERE COVER WILL BE DISTURBED.

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: W.R.K.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: CADD	STORM DRAIN PROFILES & SECTION CUTS		
Checked by: C.J.M.			
Submitted by: R.M.A.	Scales: 1"=30'-0"	Sheet numbers:	Plot Scale: 30:1
	Date: FEBRUARY 1997	Design File:	G501C006.2D
	Dwg. No.: AF 141-753-01	File No.:	

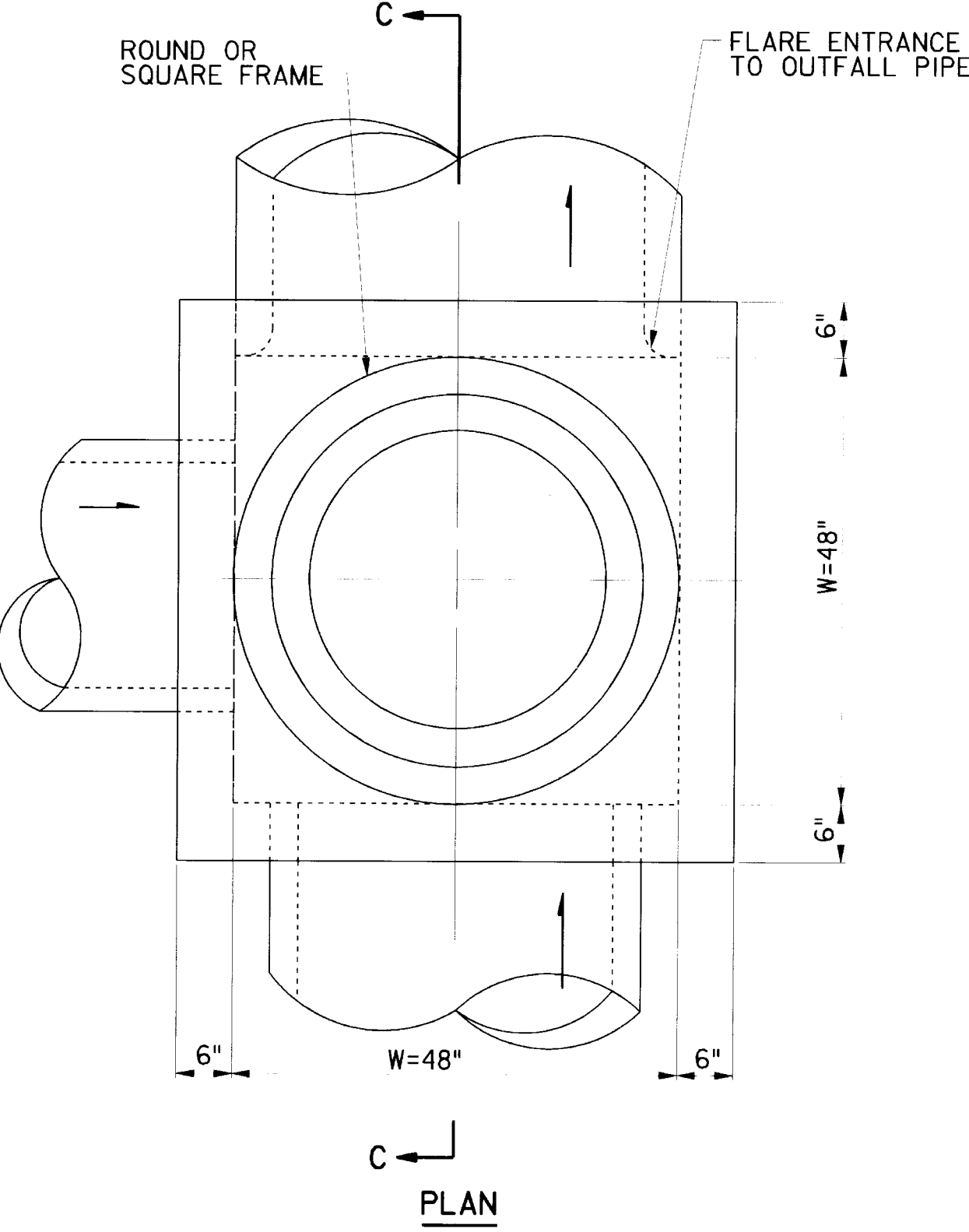
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

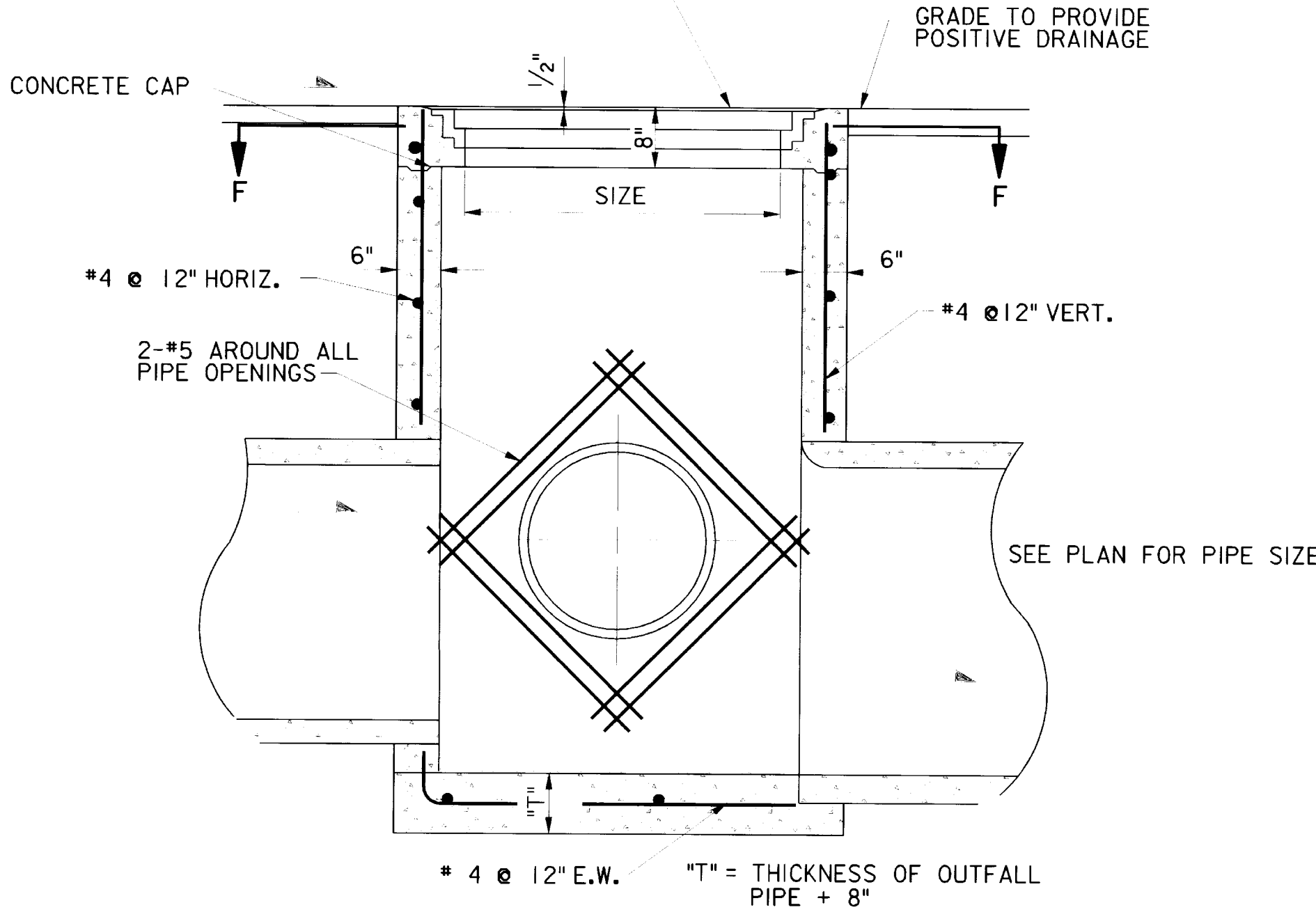


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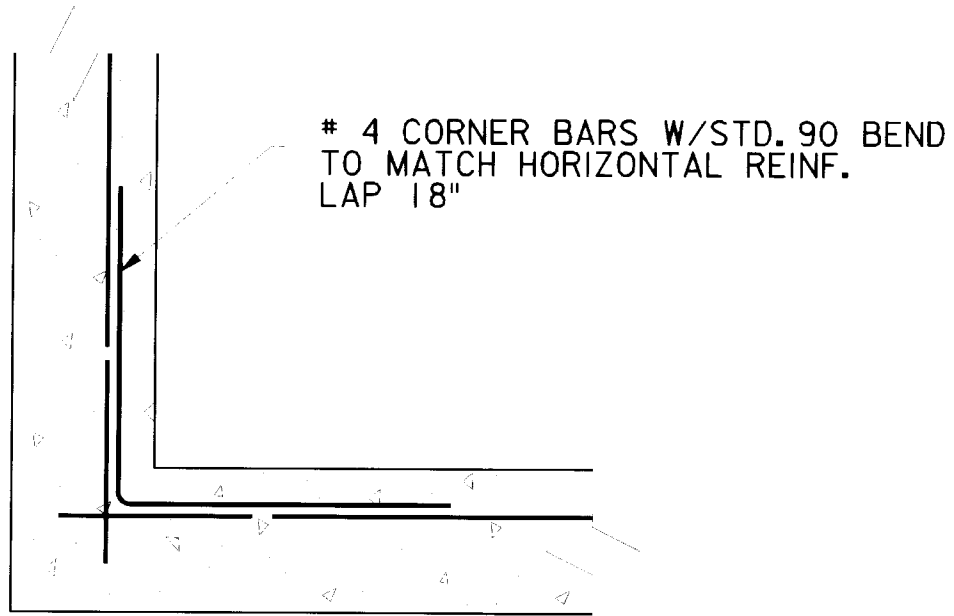
FRAME & GRATE SHALL BE NEENAH HEAVY DUTY FRAME
& COVER R-2580 OR APPROVED EQUAL. GRATE SHALL BE
36" Ø MIN. SEE PROFILE FOR TOP OF GRATE ELEV.



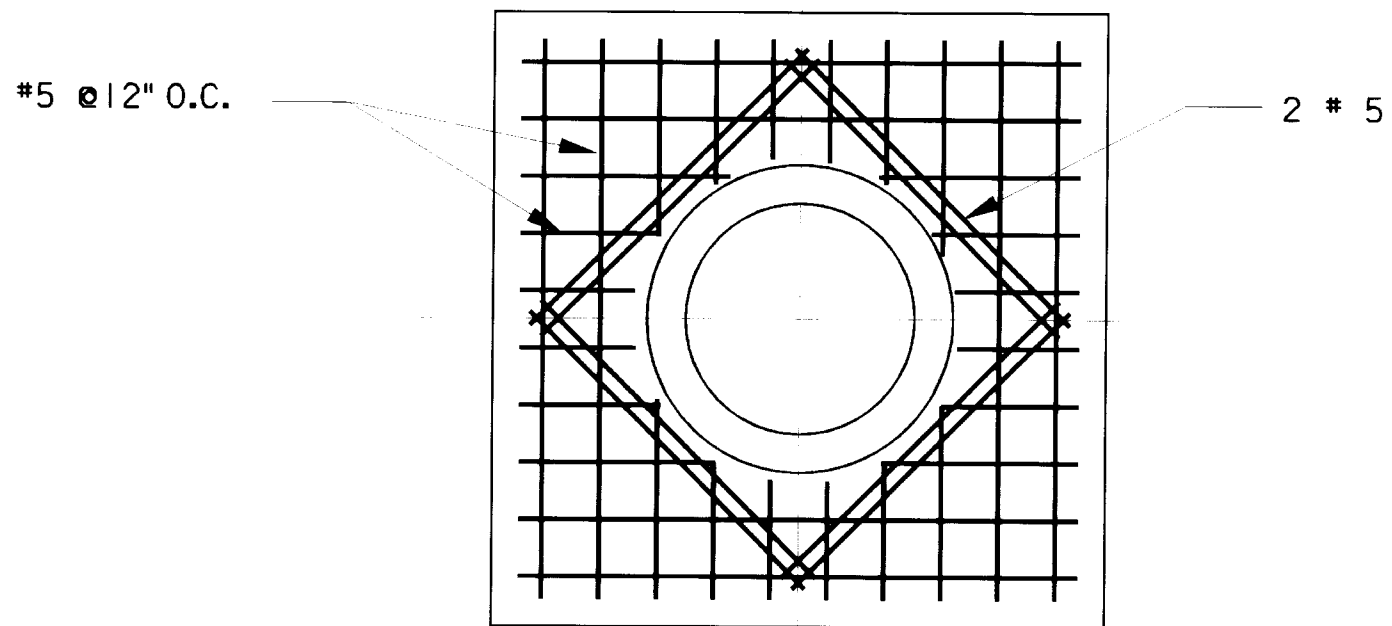
AREA INLET (AI)/MANHOLE
NOT TO SCALE



SECTION C-C
NOT TO SCALE



PLAN - CORNER REINFORCEMENT DETAIL
CURB INLET AND MANHOLE
NOT TO SCALE



SECTION F-F
NOT TO SCALE

GENERAL NOTES

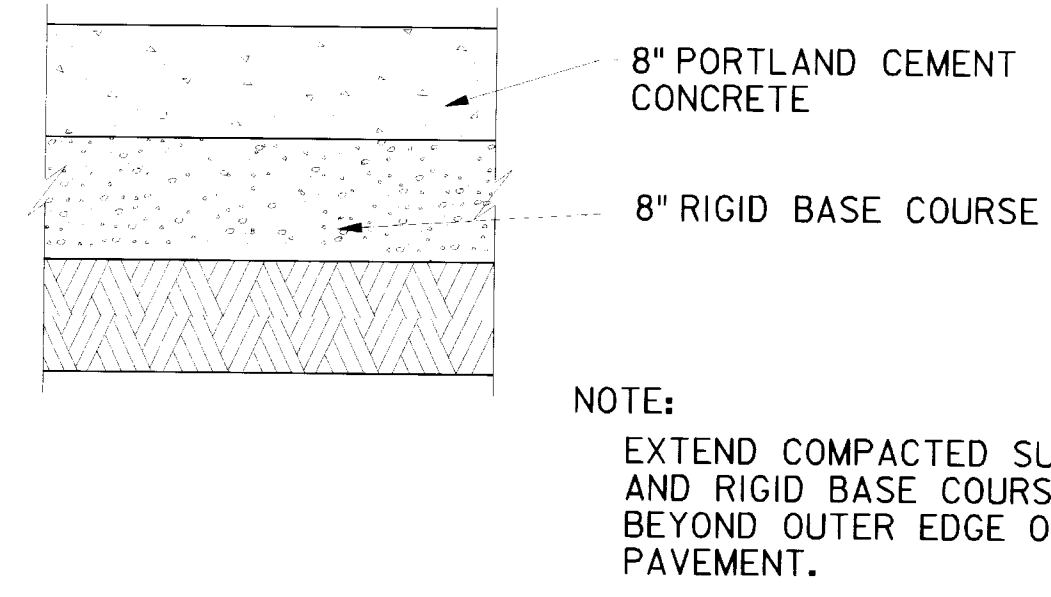
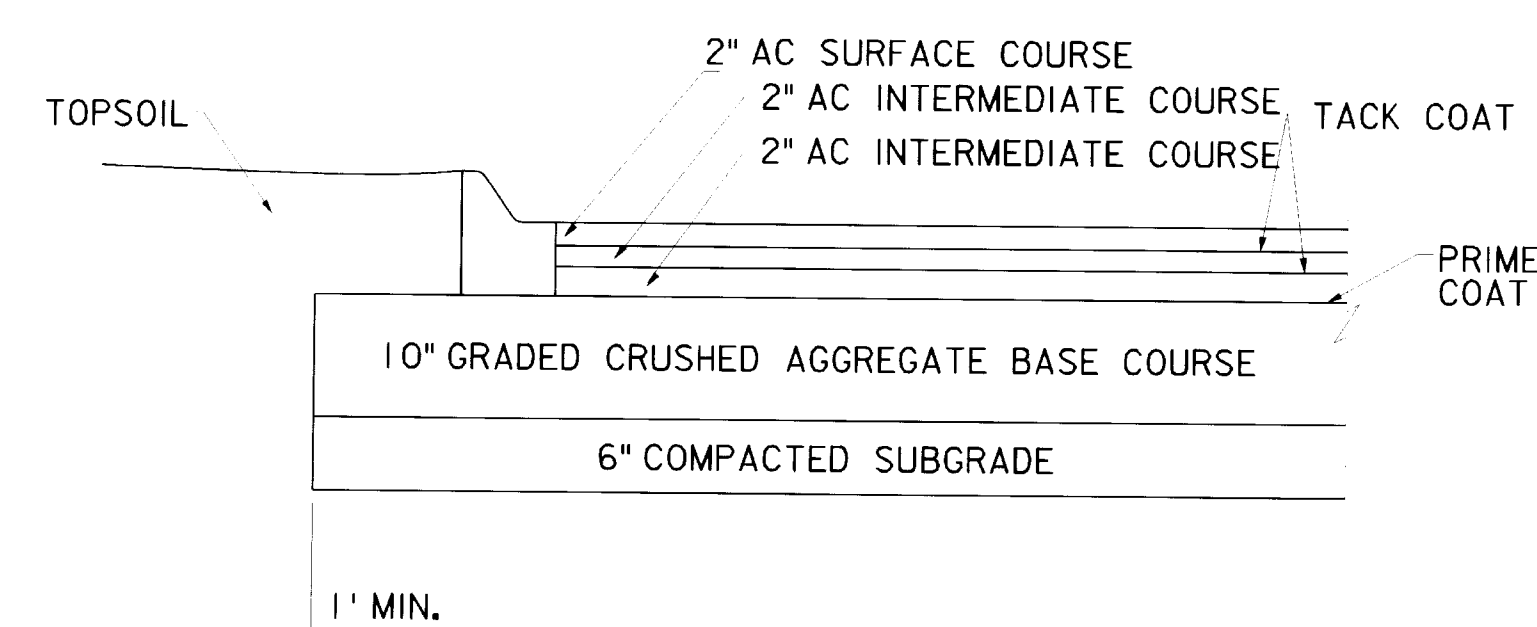
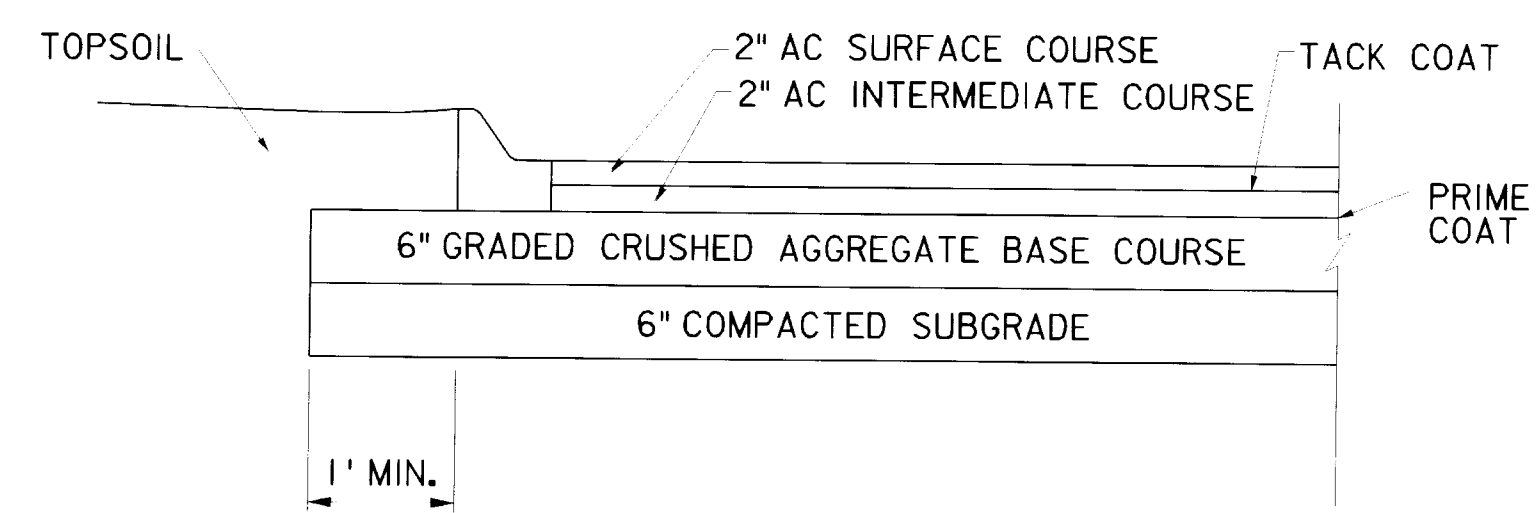
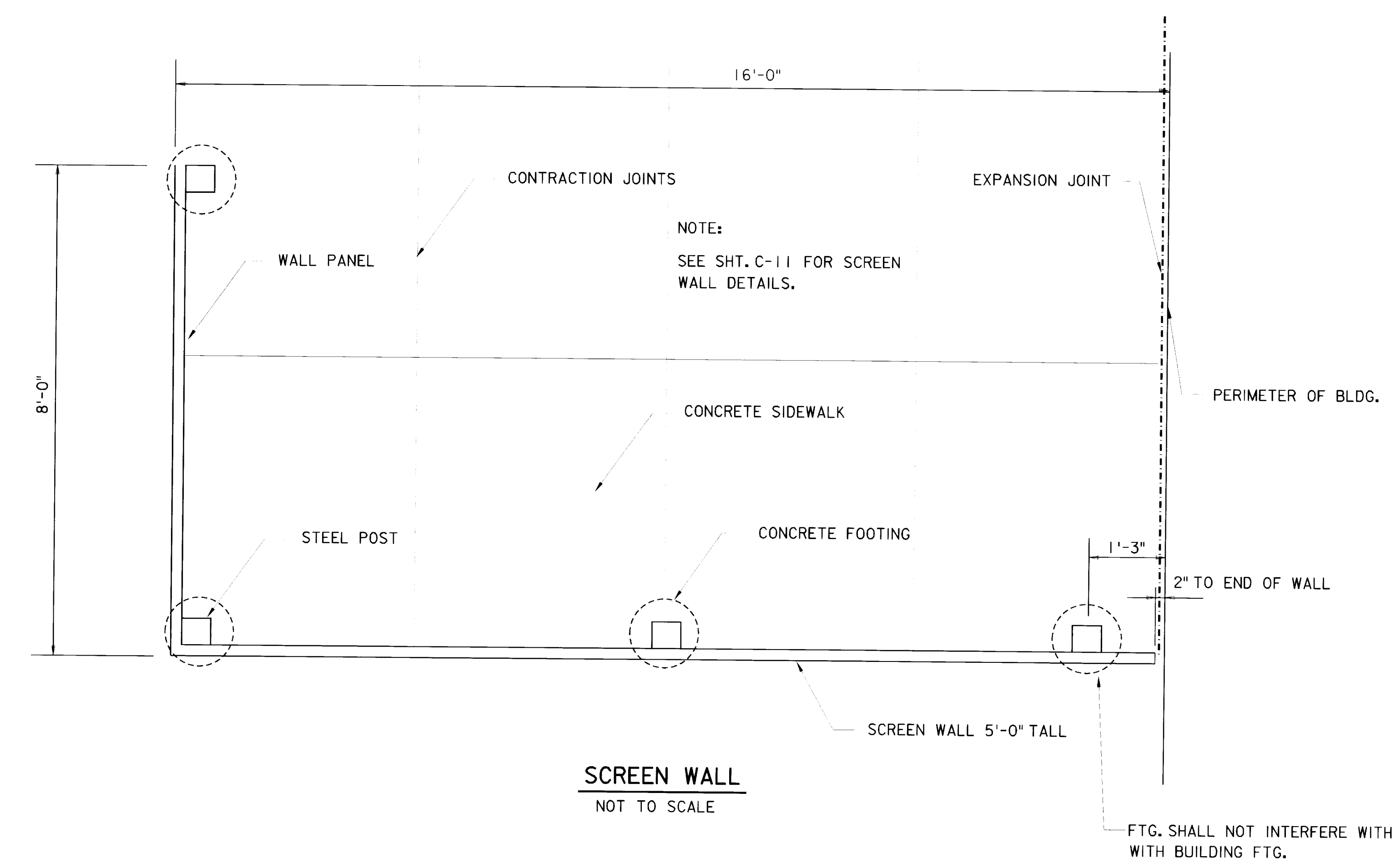
1. FOR LOCATION OF INLET, SEE PLAN.
2. USE STEEL GRADE 60 UNLESS OTHERWISE INDICATED.
3. THE MINIMUM CLEAR COVER FOR REINFORCEMENT IN WALLS PLACED AGAINST SOIL SHALL BE 3"

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: W.R.K.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: W.R.K.	STORM DRAINAGE DETAILS		
Checked by: C.J.M.			
Submitted by: R.M.A.	Scale: AS SHOWN	Sheet number:	Plot Scale: 8:1
	Date: FEBRUARY 1997	Design File:	C501C007.3D
	Dwg. No.: AF 141-753-01	C-7	File No.:

631-000- 156-14 C-7

VALUE ENGINEERING PAYS



AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	W.R.K.	SITE DETAILS	
Checked by:	C.J.M.		
Submitted by:	R.M.A.	Scale: AS SHOWN	Sheet number: C-8
		Date: FEBRUARY 1997	Plot Scale: 8:1
		Dwg. No.: AF 141-753-01	Design File: G501C008.2D
			File No.:

631-000-156-15 C-8

5

4

3

2

1

D

C

B

A

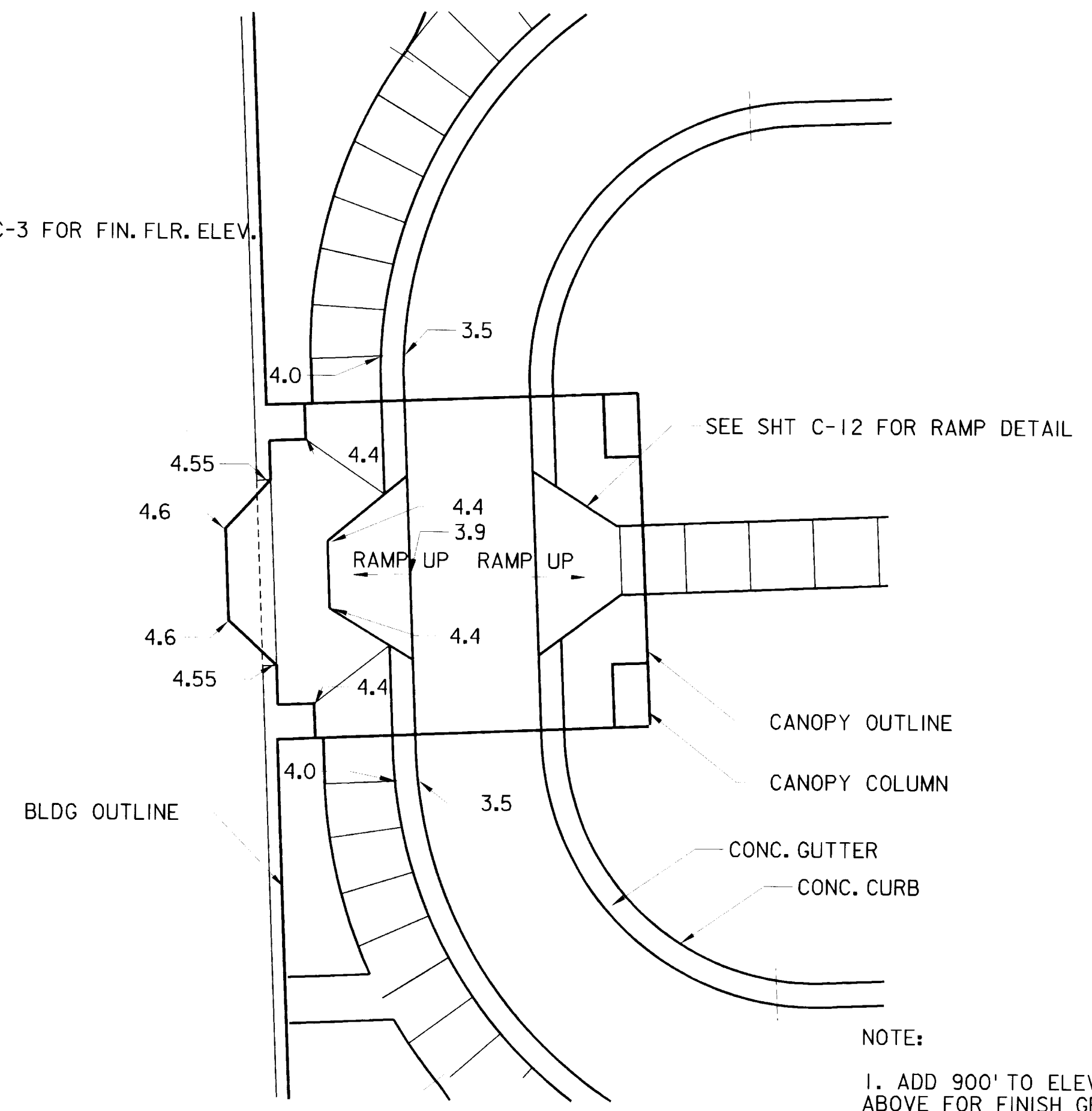
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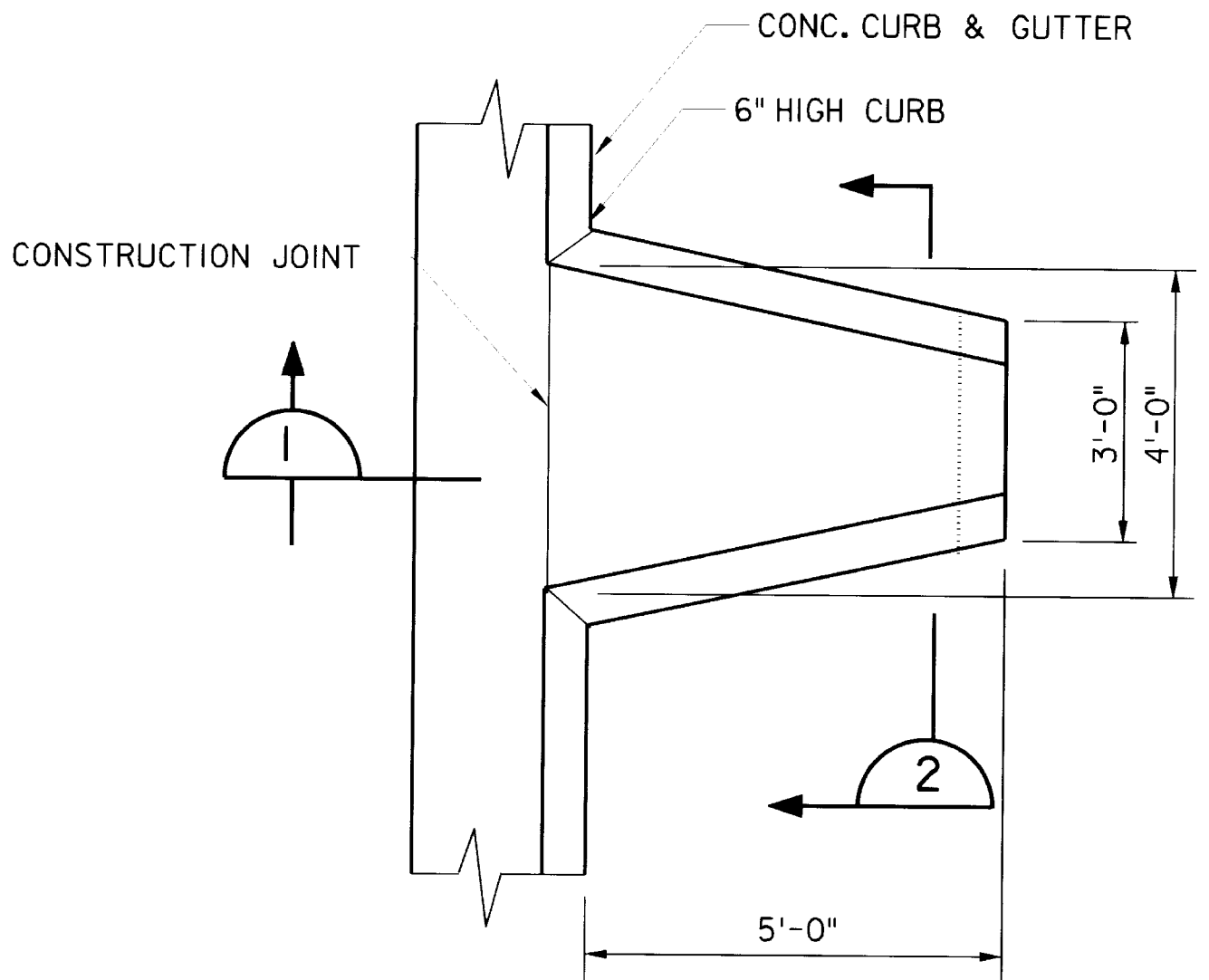
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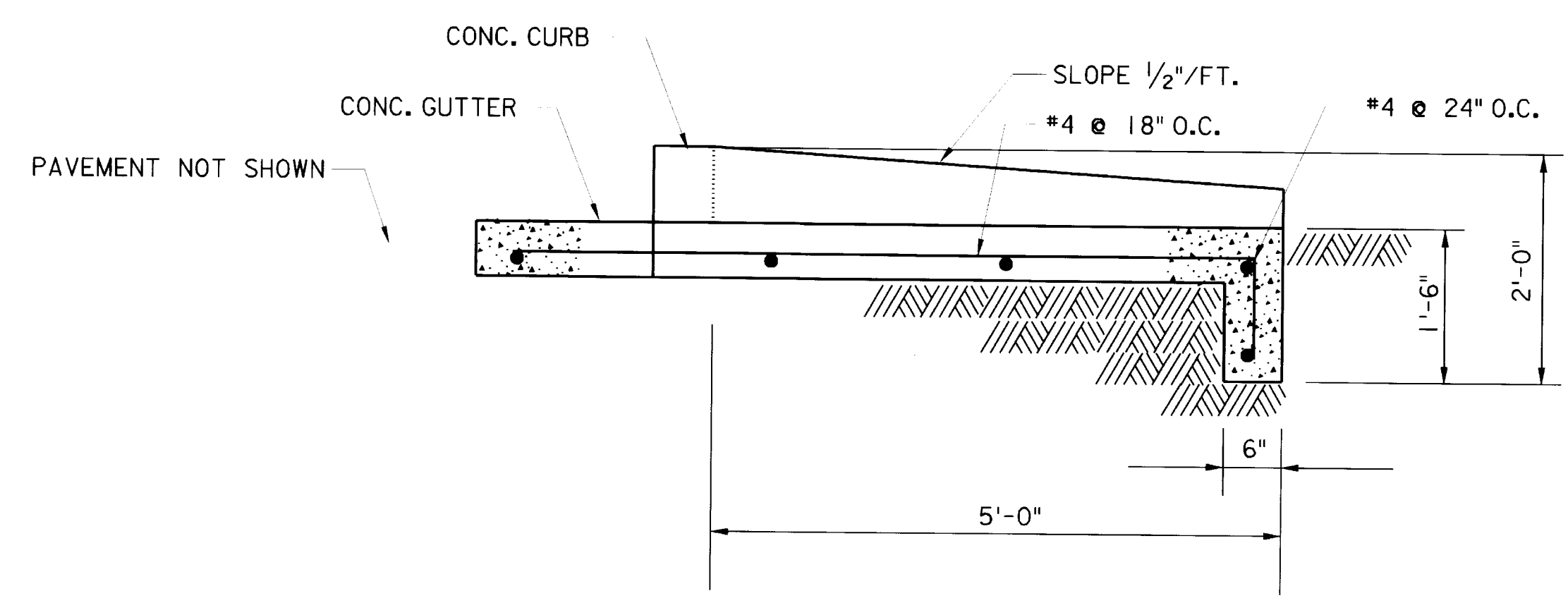
SEE SHT. C-3 FOR FIN. FLR. ELEV.



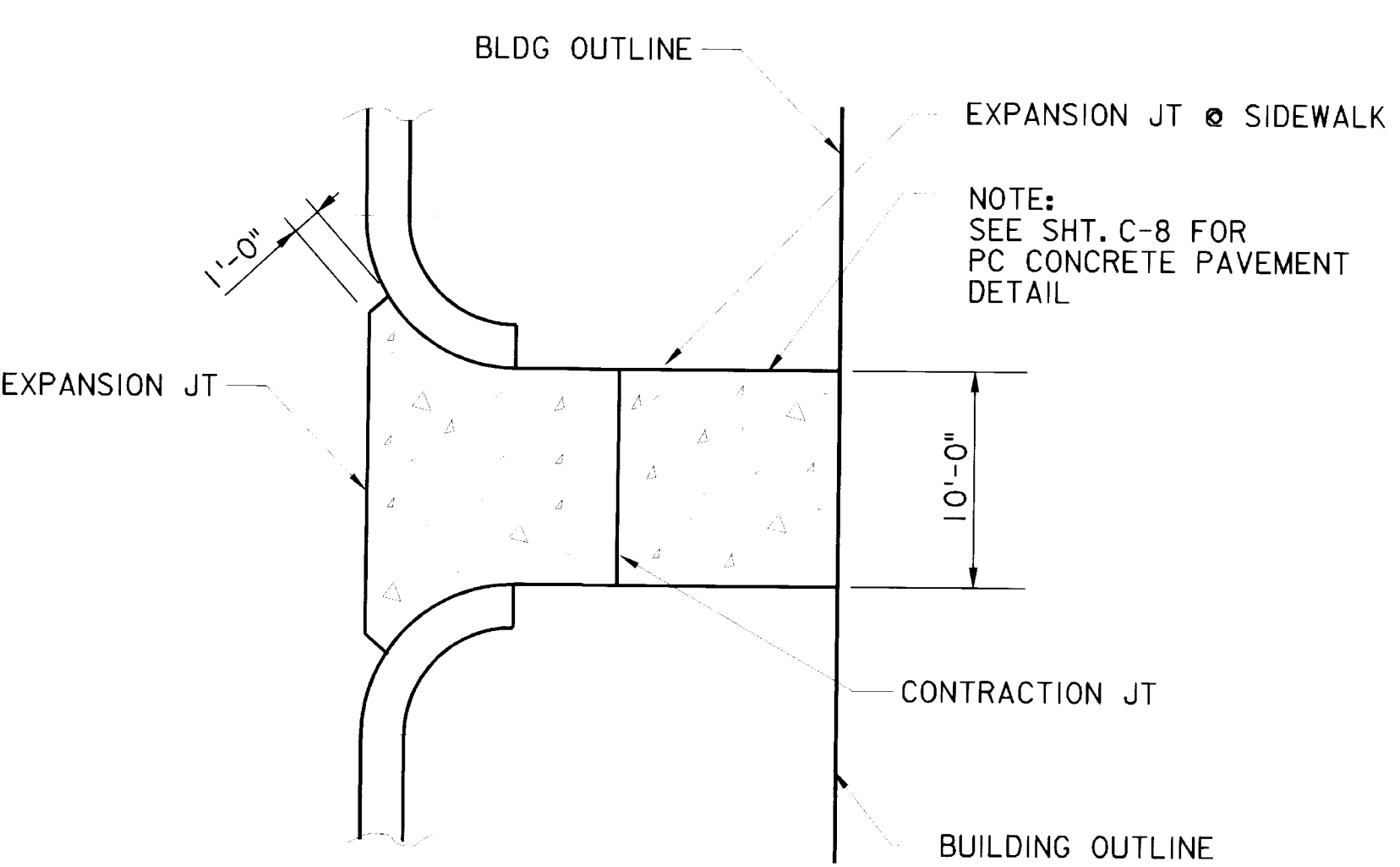
ENLARGED ENTRANCE PLAN
NOT TO SCALE



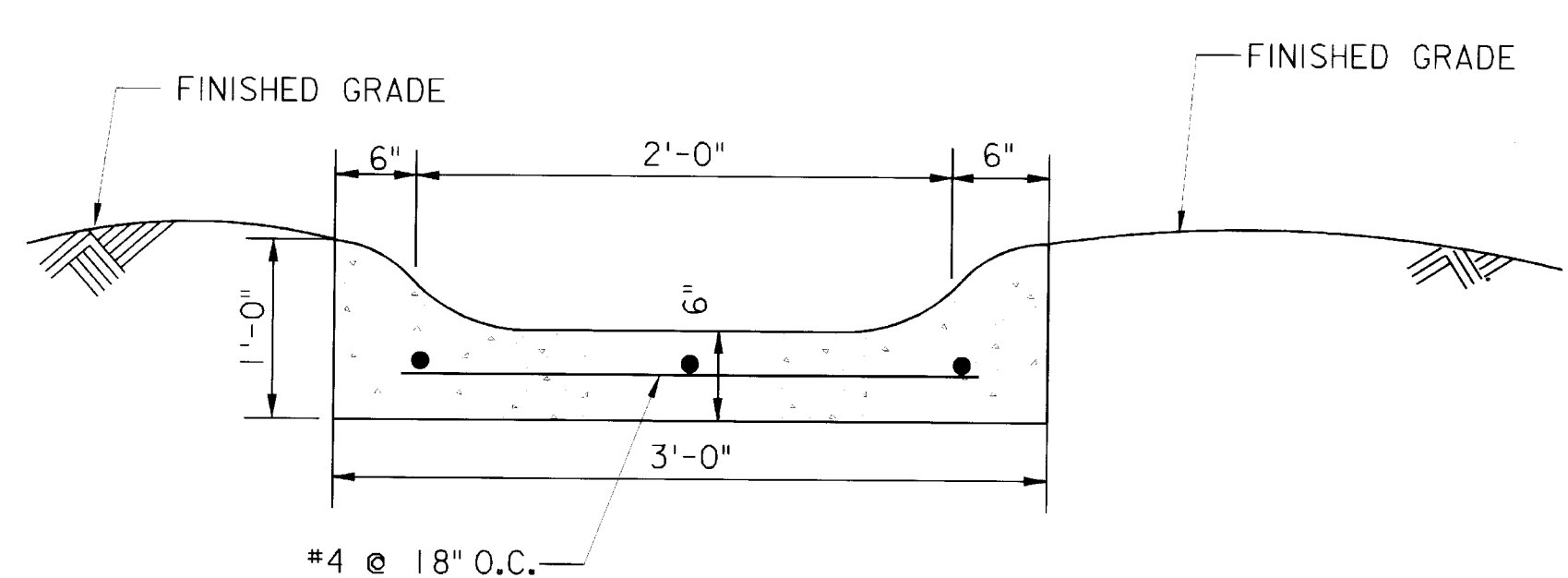
CURB CUTOUT PLAN
NOT TO SCALE



SECTION
NOT TO SCALE



CONCRETE SERVICE ENTRANCE
NOT TO SCALE

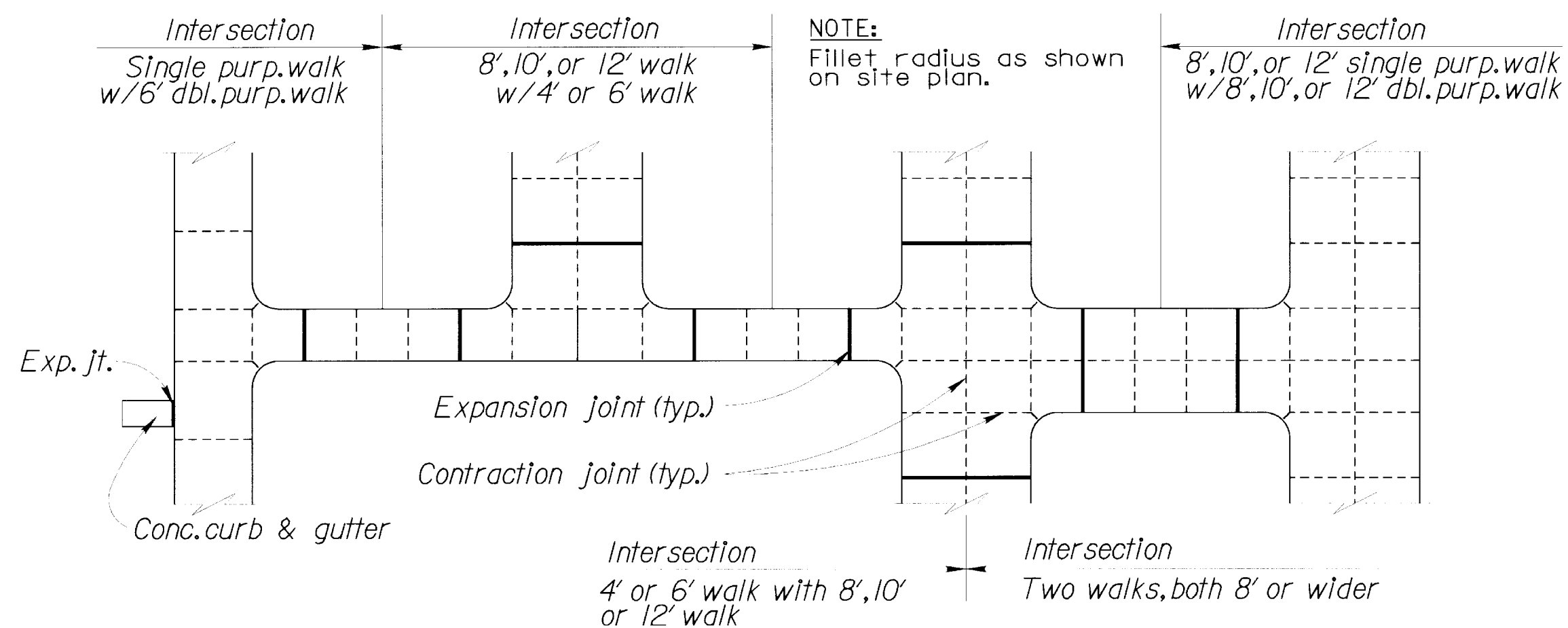


CONCRETE FLUME SECTION
NOT TO SCALE

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

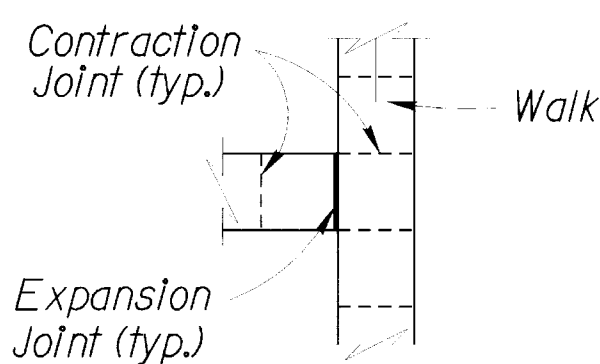
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	W.R.K.	SITE DETAILS	
Checked by:	C.J.M.	Scale: AS SHOWN	Sheet Scale: 30 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g501c009.3d
	Dwg. No.: AF 141-753-01	C-9	File No.:

631-000- 156-16 C-9



TYPICAL SIDEWALK JOINT LAYOUT WITH FILLETS
NOT TO SCALE

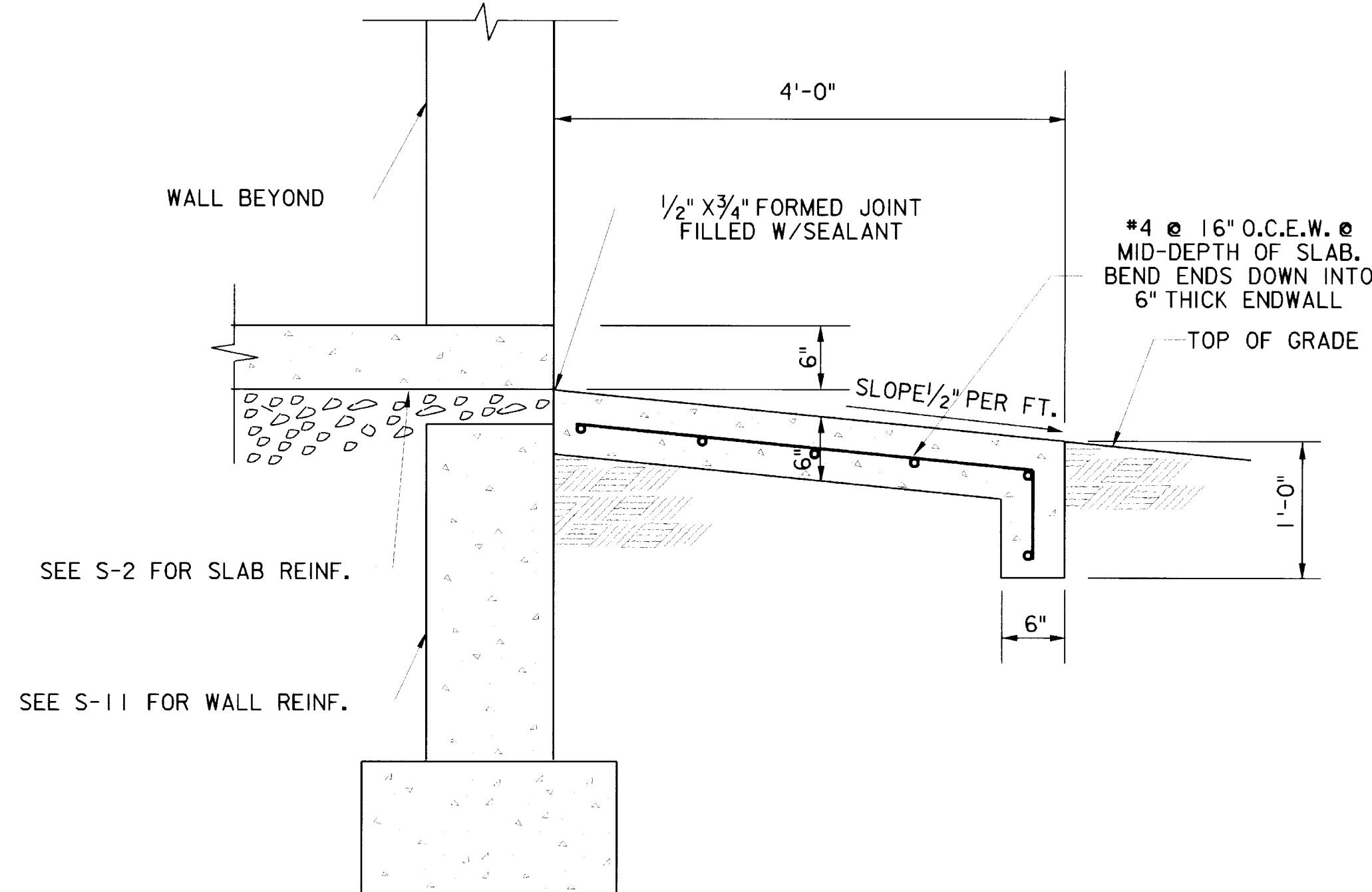
WALK WIDTH	JOINT SPACING FOR STRAIGHT RUNS		
	CONTRACTION JOINT SPACING	LONGITUDINAL JOINT SPACING	EXPANSION JOINT SPACING
4'	4'	NOT REQUIRED	40' MAX.
6'	6'	NOT REQUIRED	42' MAX.
8'	4'	4'	40' MAX.
10'	5'	5'	40' MAX.
12'	6'	6'	42' MAX.



TYPICAL SIDEWALK JOINT LAYOUT WITHOUT FILLETS
NOT TO SCALE

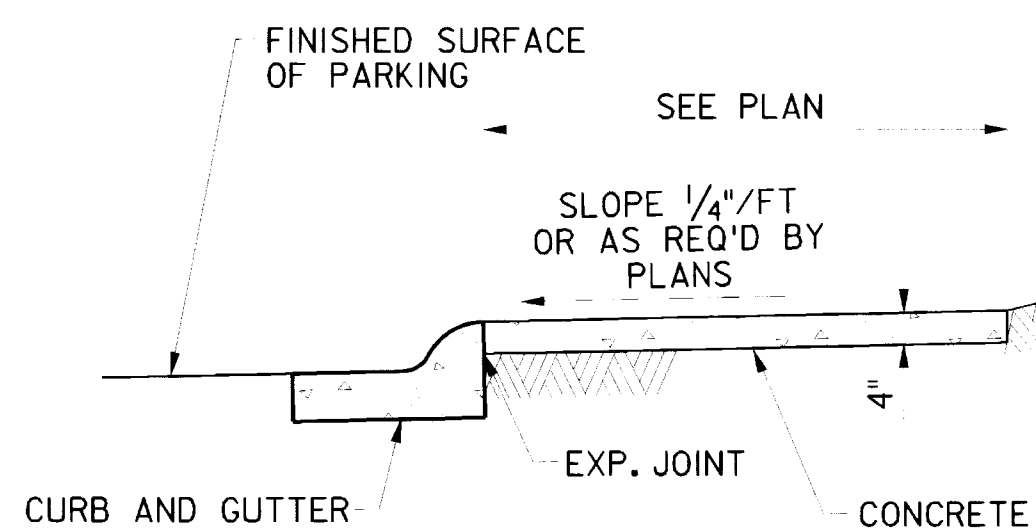
NOTES:

1. TRANSVERSE EXPANSION JOINTS SHALL BE CONTINUOUS.

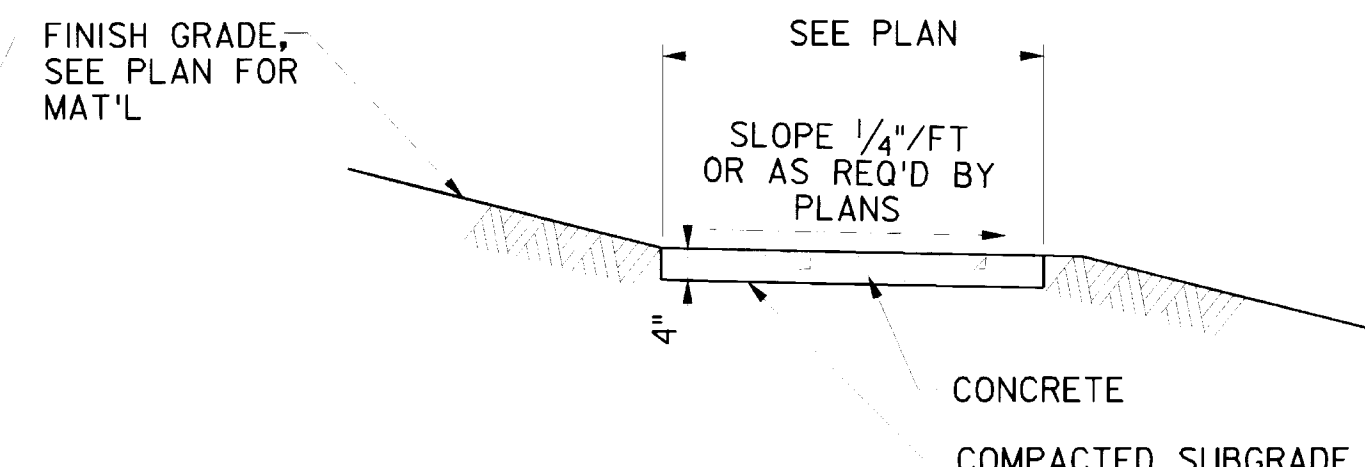


EXTERIOR CONCRETE DOOR PAD

WITH STEP
NOT TO SCALE

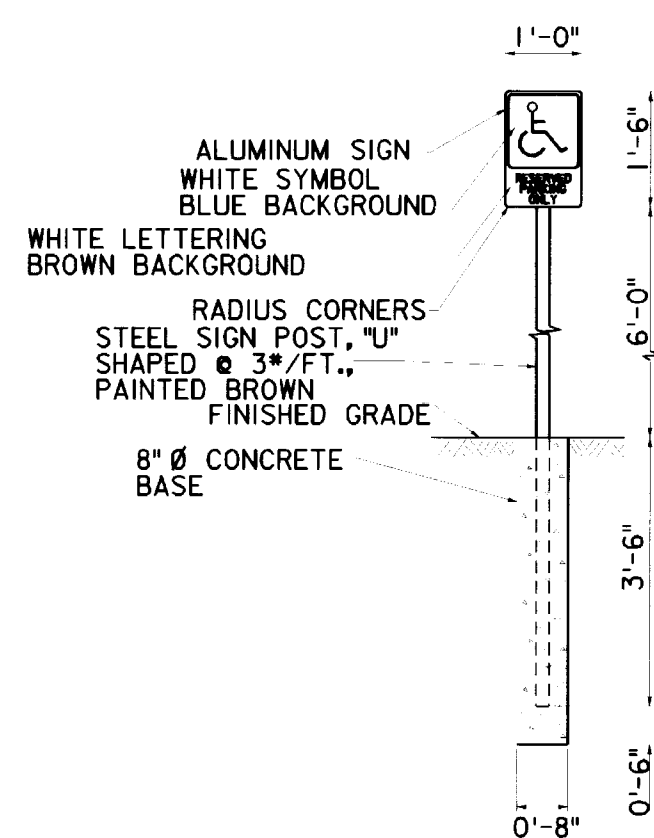


TYPICAL SECTION

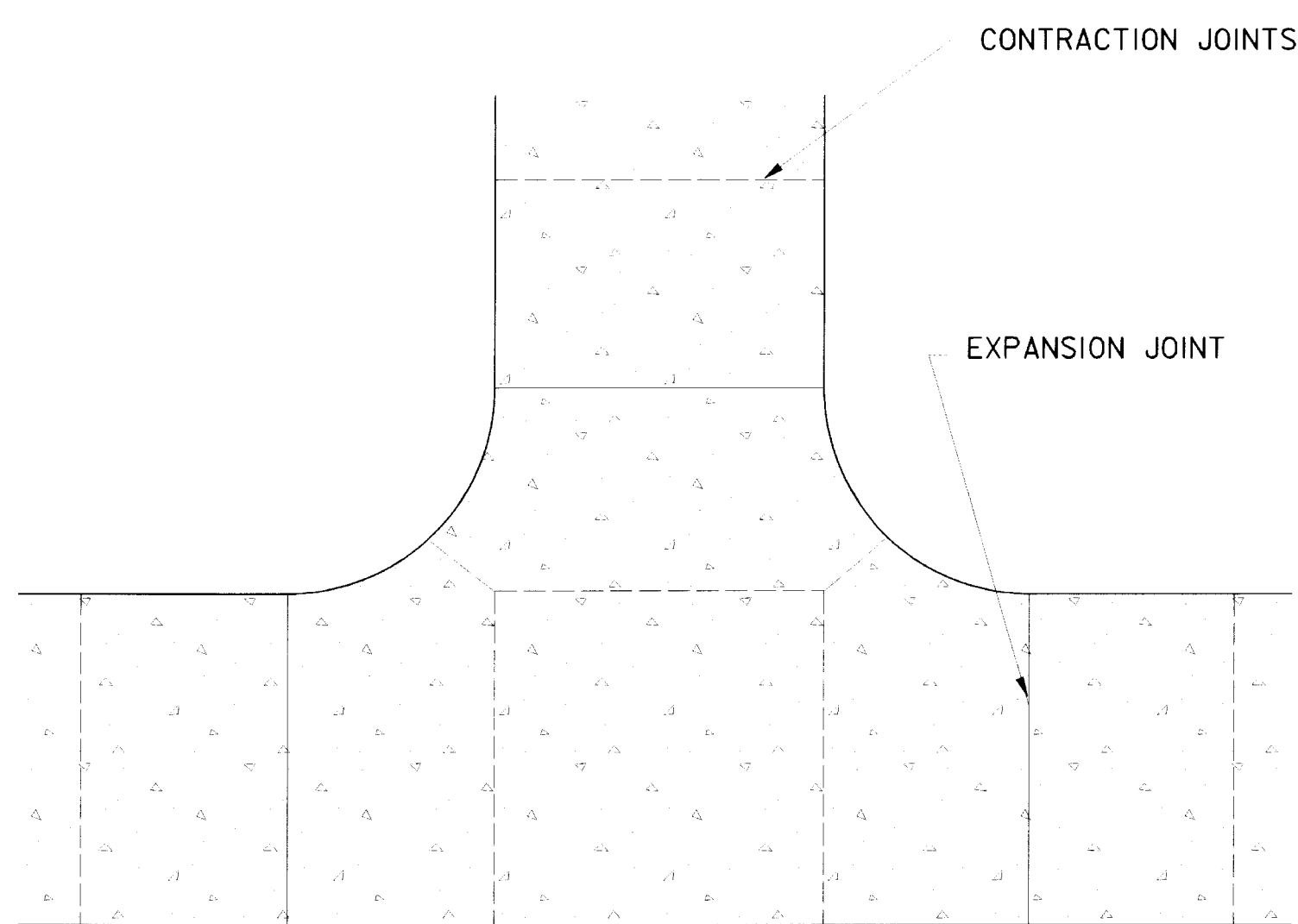
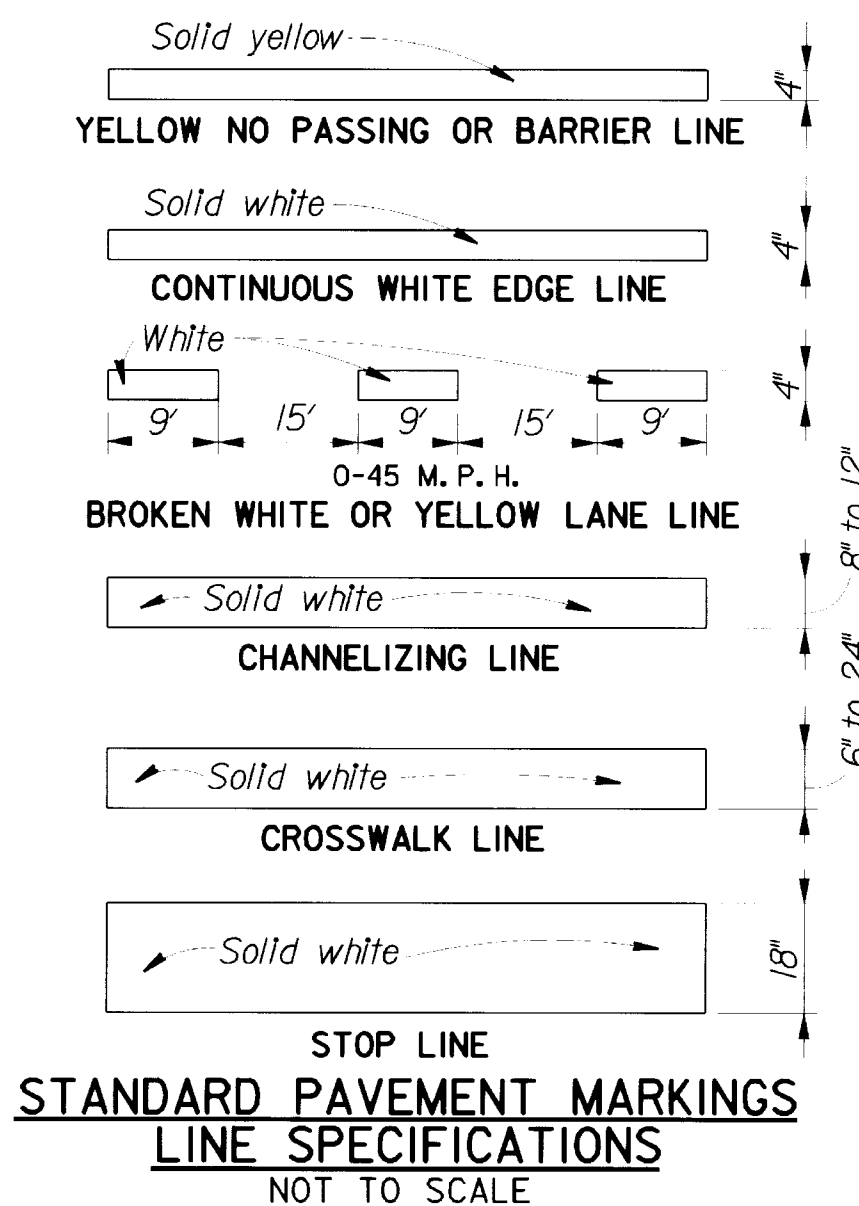


TYPICAL SECTION

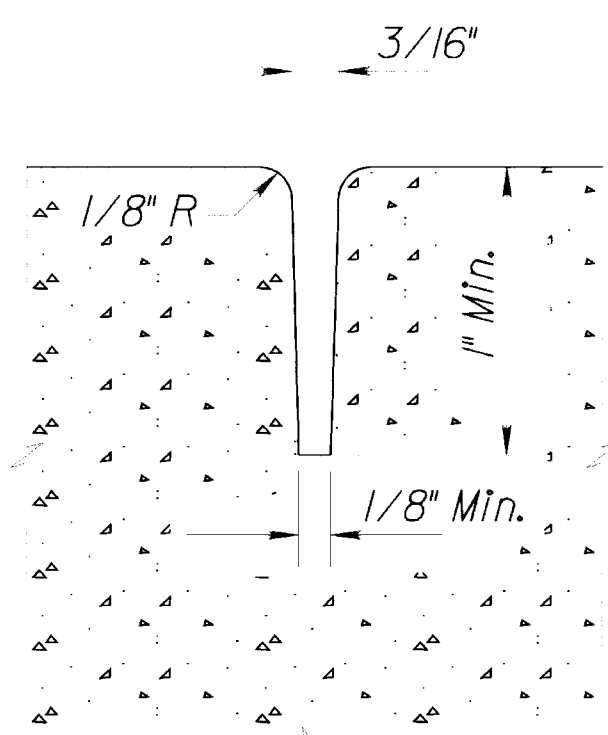
WALK DETAILS
NOT TO SCALE



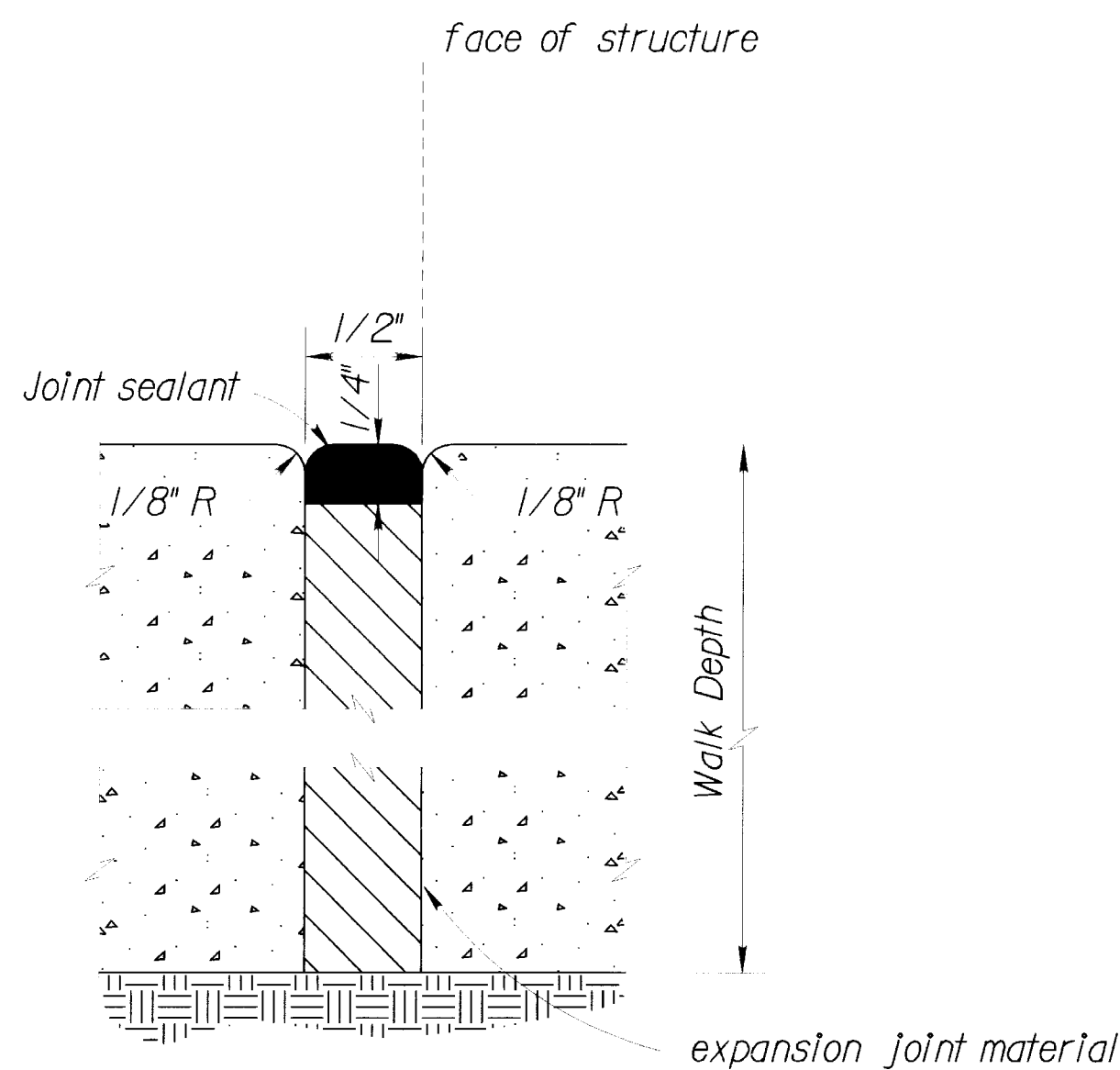
HANDICAPPED PARKING SIGN
NOT TO SCALE



WALK INTERSECTION DETAIL
NOT TO SCALE



CONTRACTION JOINT



EXPANSION JOINT

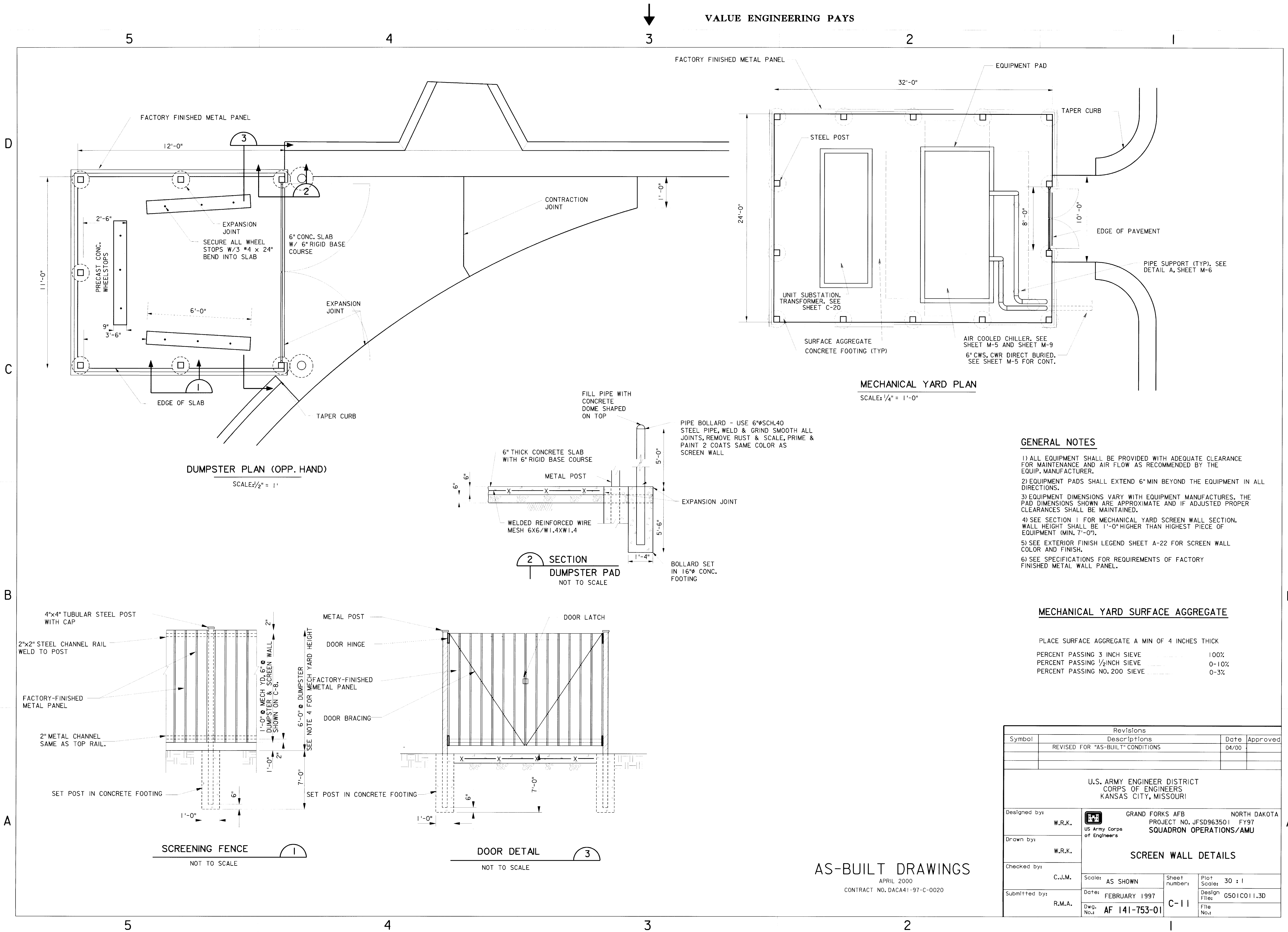
SIDEWALK JOINT DETAILS
NOT TO SCALE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	W.R.K.	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	W.R.K.	SITE DETAILS	
Checked by:	C.J.M.	Scale: AS SHOWN	Sheet number: 30 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g501c010.3d
		Dwg. No.: AF 141-753-01	File No.:

631-00-156-17 C-10

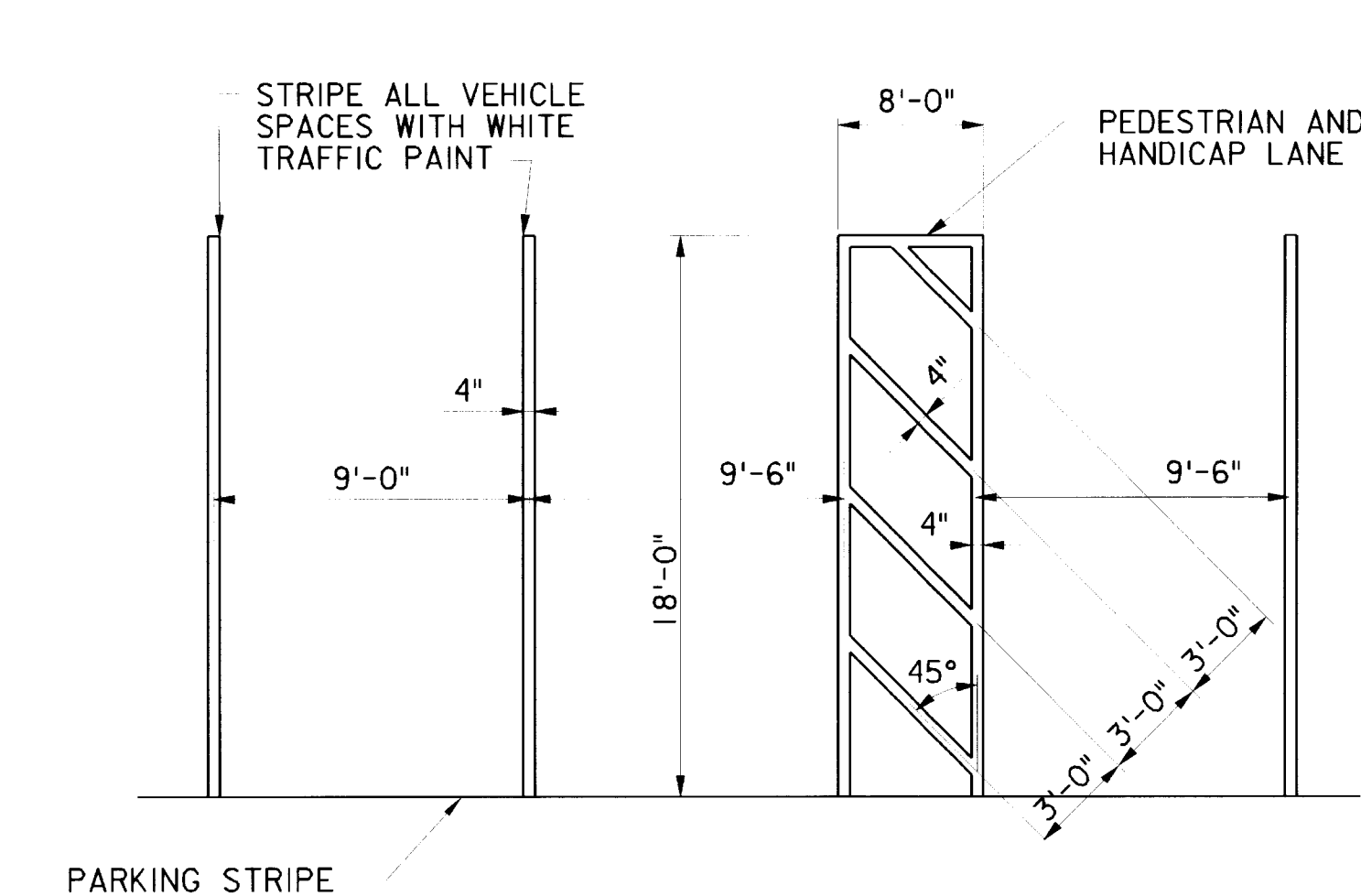


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

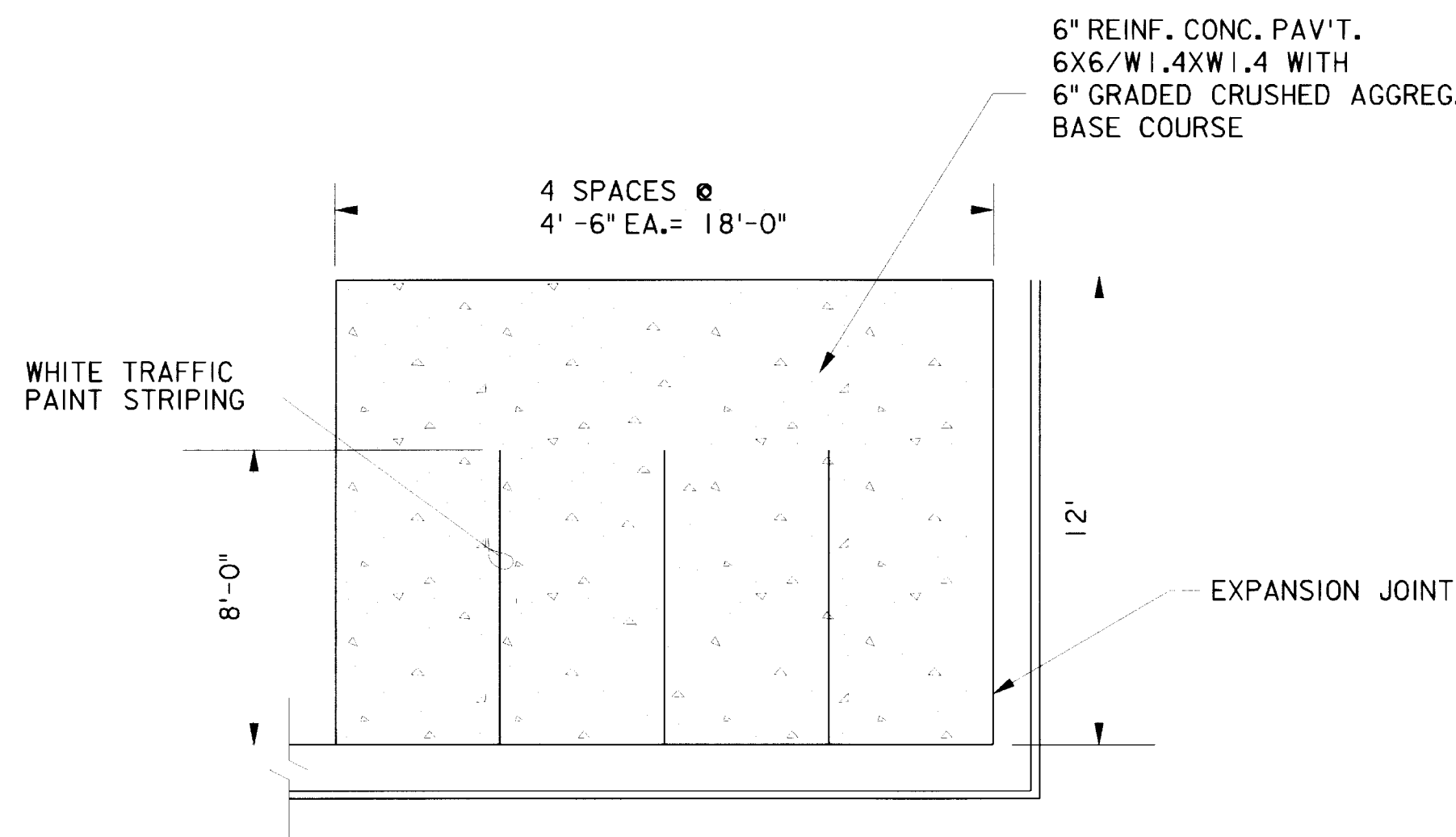
631-000-156-18 C-11

5 4 3 2 1

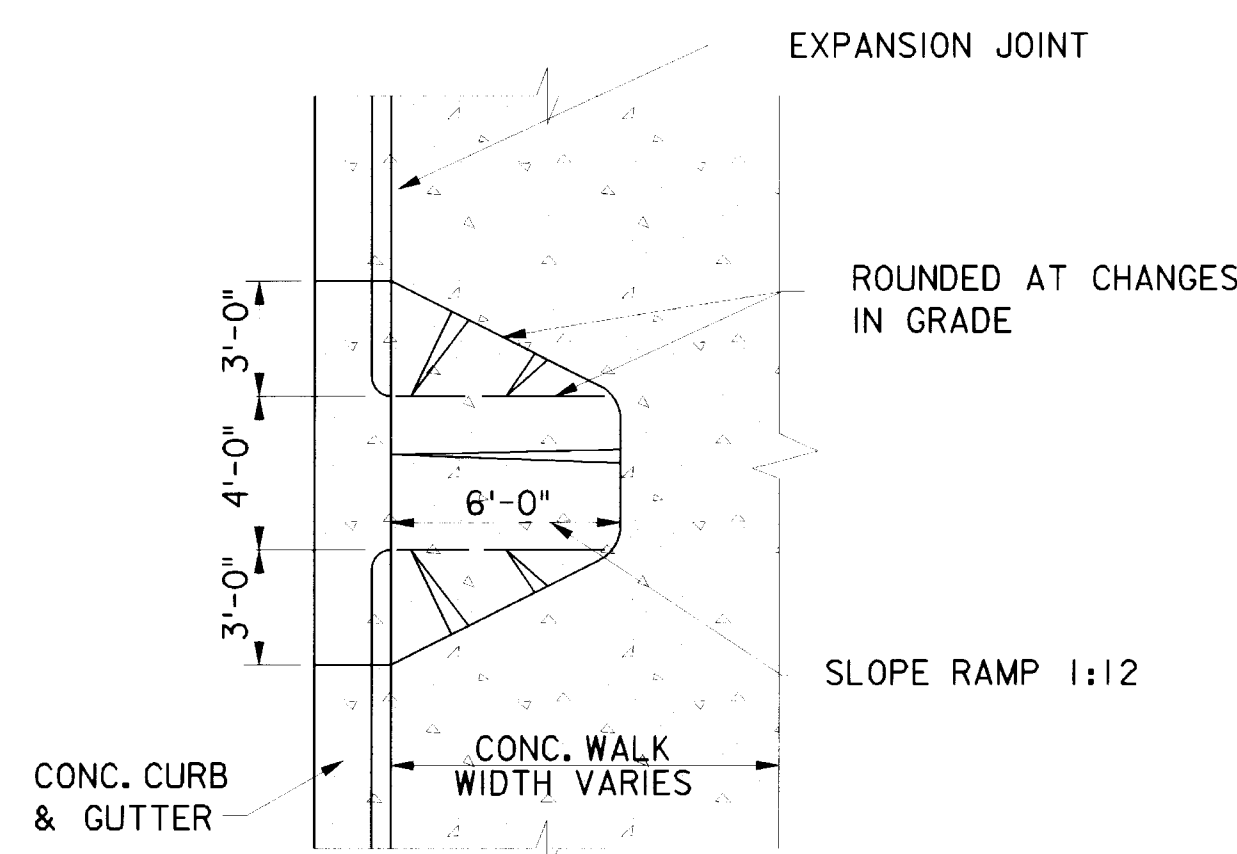


ALL PAVEMENT MARKINGS ARE WHITE (UNO)

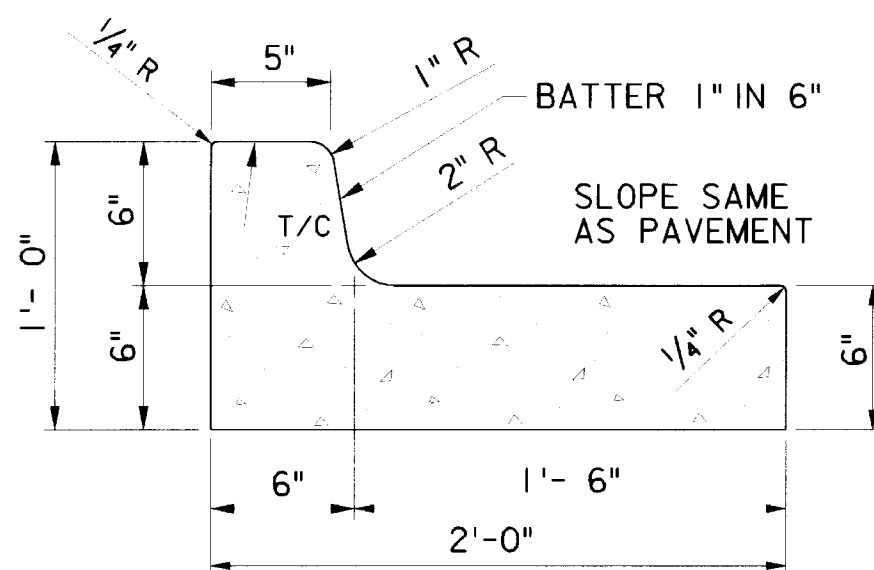
PAVEMENT STRIPING DETAIL
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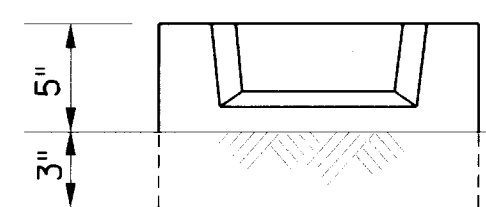
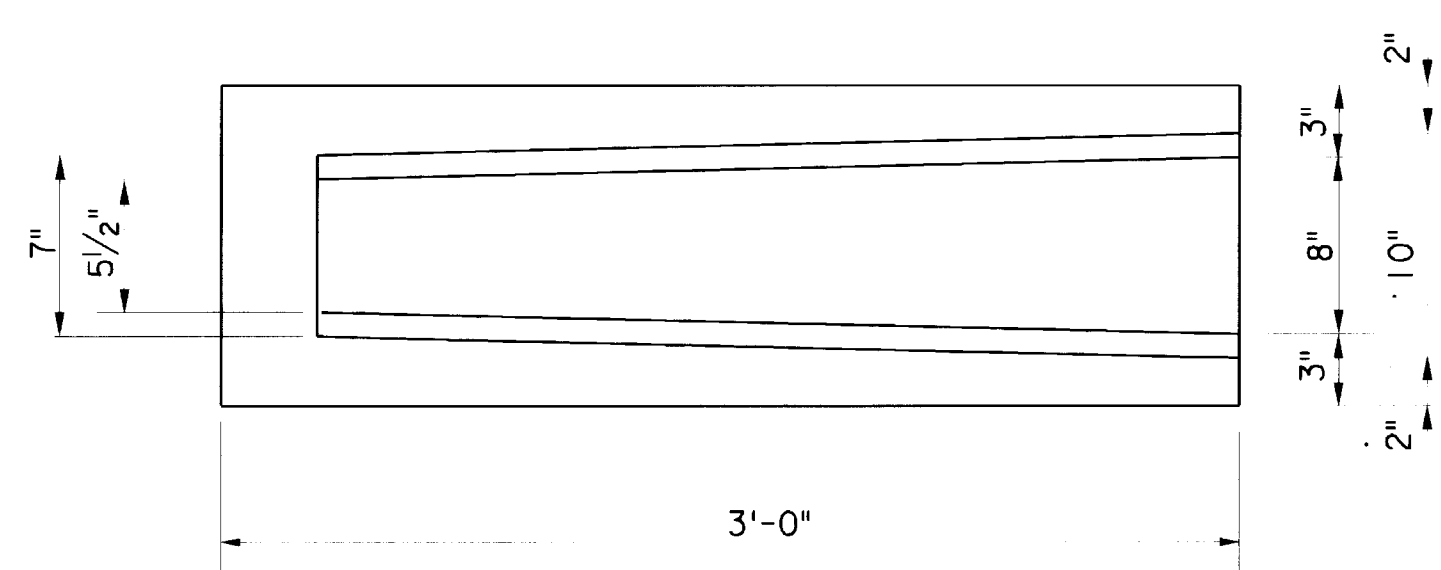
MOTORCYCLE PARKING DETAIL
NOT TO SCALE



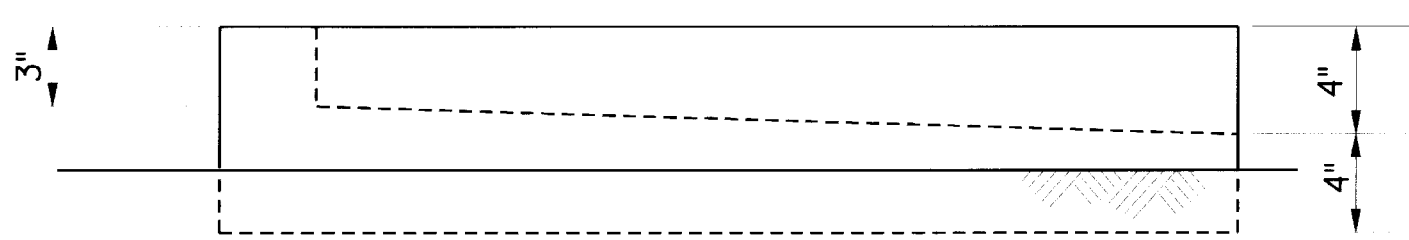
CURB RAMP DETAIL
NOT TO SCALE



CONCRETE CURB AND GUTTER
NOT TO SCALE



NOTE:
SEE ARCHITECTURAL ELEVATIONS
FOR LOCATION OF DOWNSPOUTS.



PRECAST CONCRETE SPLASHBLOCK
NOT TO SCALE

5 4 3 2 1

AS-BUILT DRAWINGS

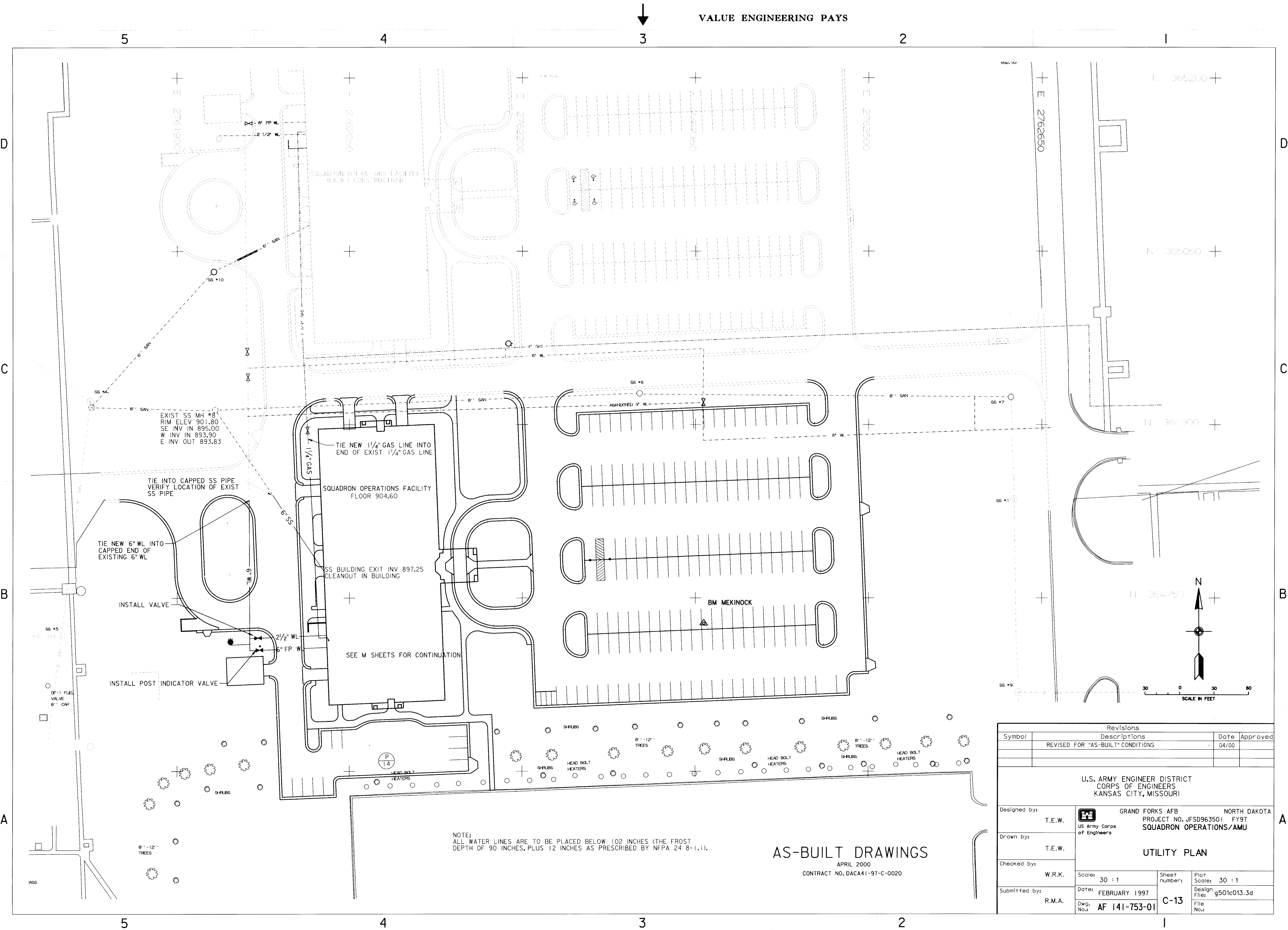
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: W.R.K.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: CADD	SITE DETAILS		
Checked by: C.J.M.			
Submitted by: R.M.A.	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Sheet numbers: C-12	Plot Scale: 8:1 Design File: G501c012.2d File No.:

631-000-156-19 C-12

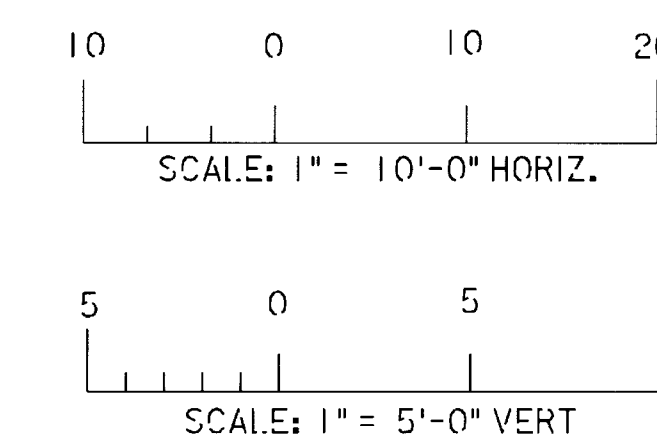
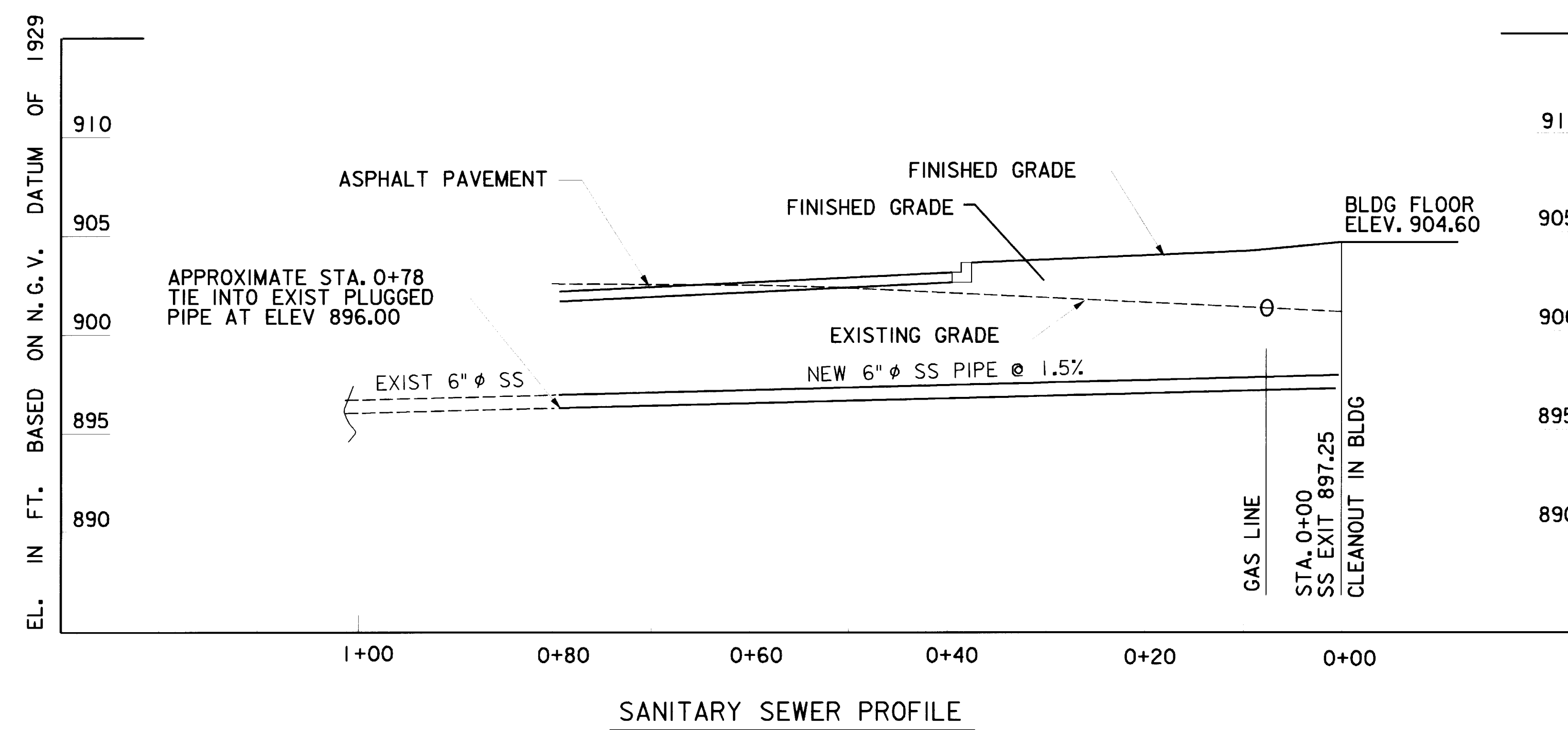
VALUE ENGINEERING PAYS

631-000-156-20 C-13



Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	T.E.W.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	T.E.W.	UTILITY PLAN	
Checked by:	W.R.K.	Scale: 30 : 1	Sheet numbers: Plot Scale: 30 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g501c013.3d
		Dwg. No.: AF 141-753-01	File No.:

VALUE ENGINEERING PAYS

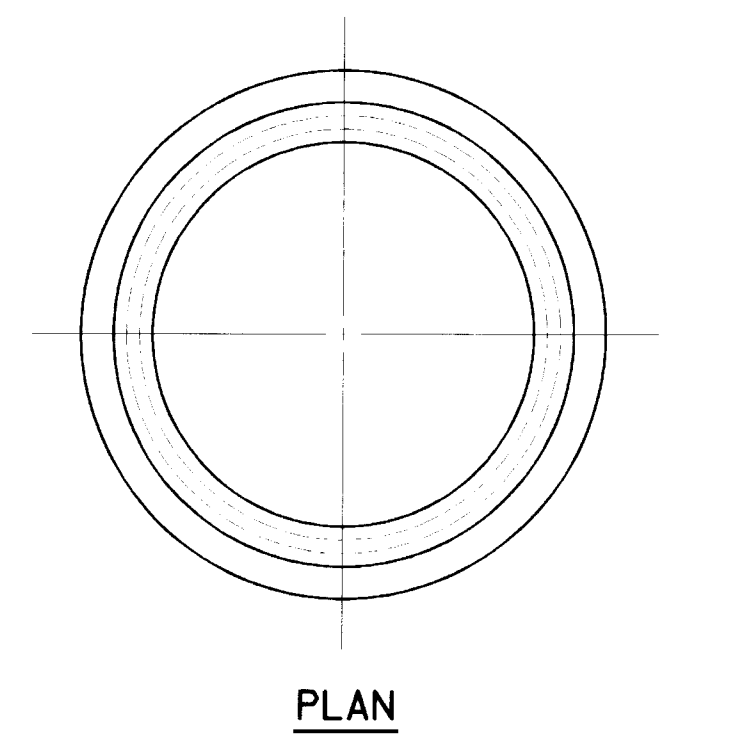


AS-BUILT DRAWINGS

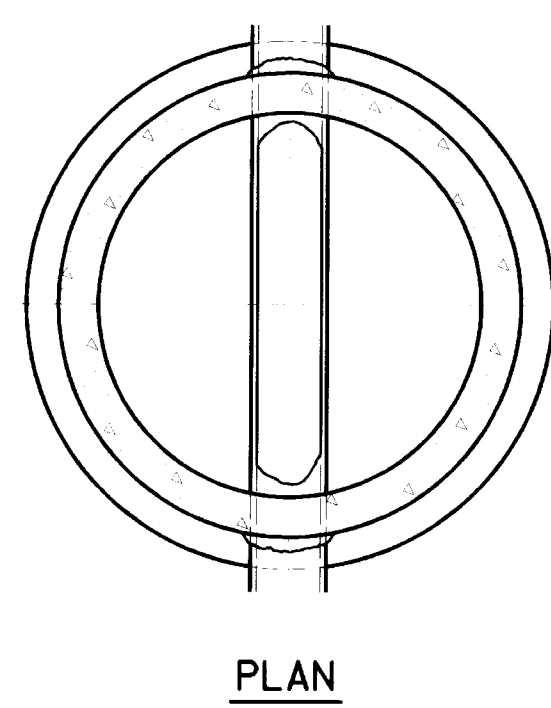
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	T.E.W.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	T.E.W.	SANITARY SEWER PROFILES	
Checked by:	W.R.K.	Scale: AS SHOWN	Sheet numbers: Plot Scale: 30:1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g501C014.2d
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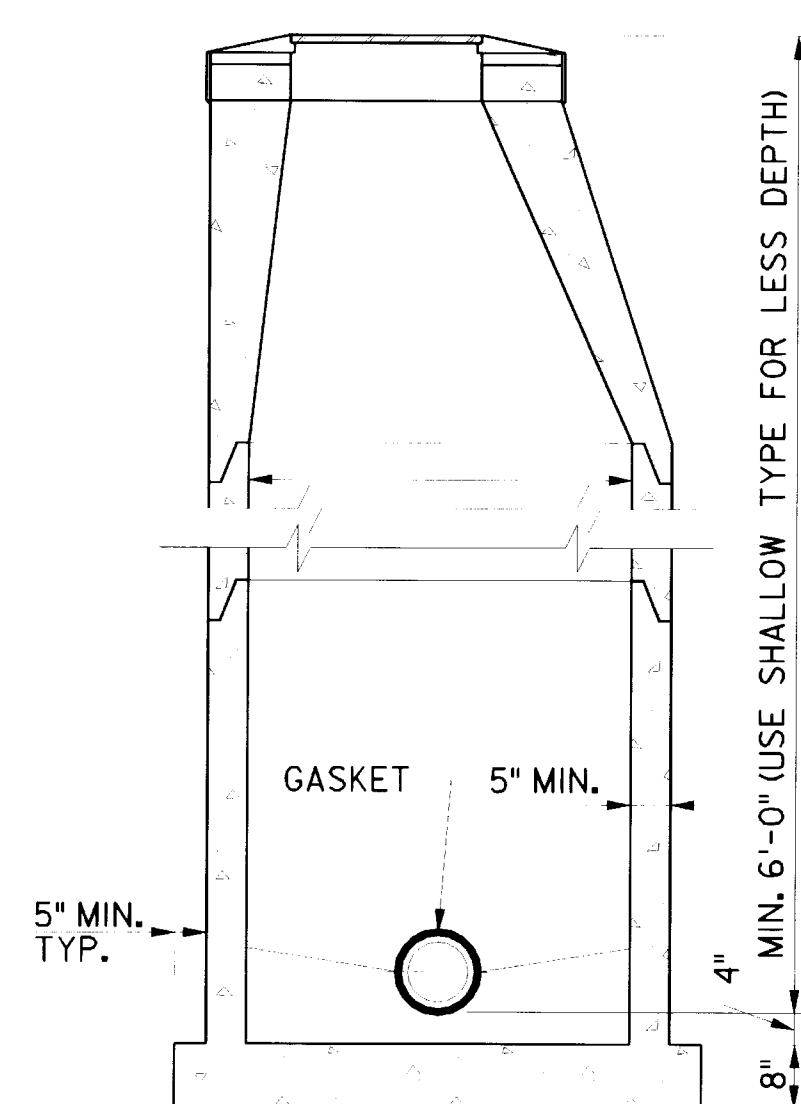
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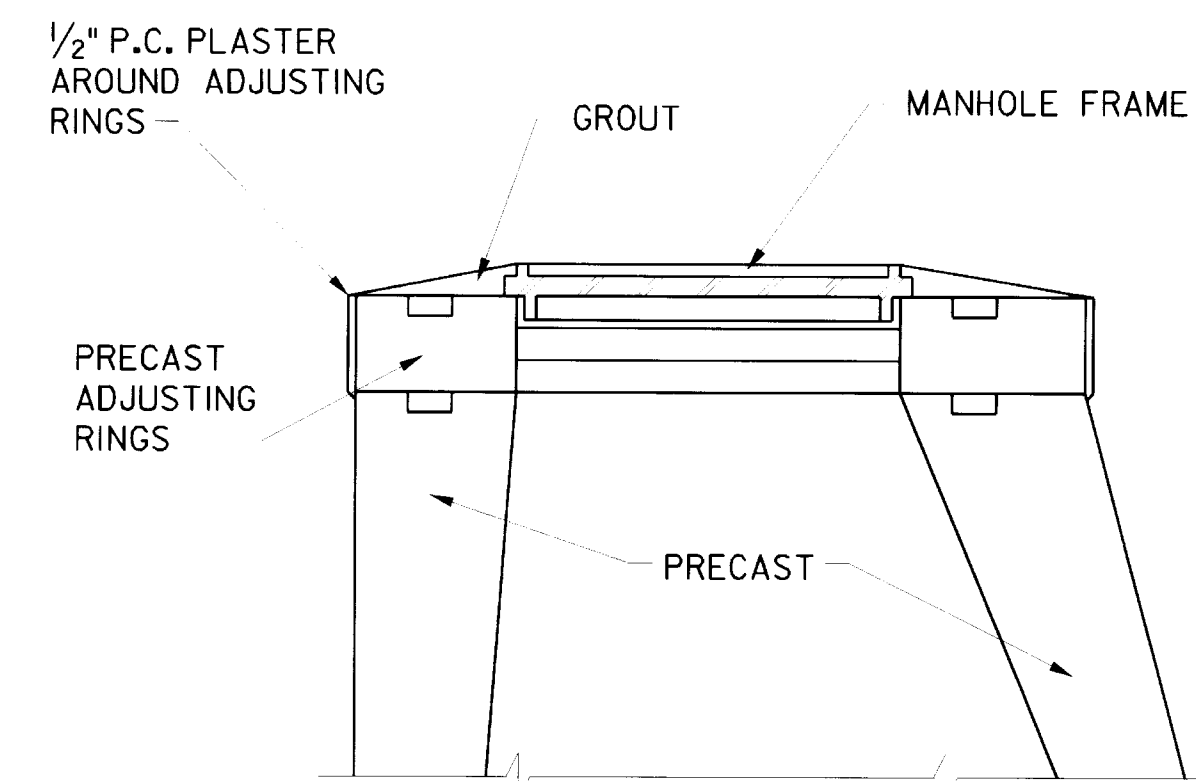
PLAN
SECTION
MANHOLE BASE
SCALE: 1/2"=1'-0"



PLAN



SECTION
THROUGH MANHOLE
SCALE: 1/2"=1'-0"



SECTION-PRECAST CONE AND
PRECAST ADJUSTING RING DETAIL

MANHOLE TOP DETAIL
SCALE: 1"=1'-0"

NOTES:

1. ALL MANHOLE SECTIONS AND ADJUSTING RINGS SHALL BE SEALED WITH 1" BUTYL RUBBER SEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. EITHER CONCENTRIC OR ECCENTRIC PRECAST CONES ARE ACCEPTABLE.
3. THERE SHALL BE A MAXIMUM OF 2 ADJUSTING RINGS ON TOP OF PRECAST ECCENTRIC CONE.

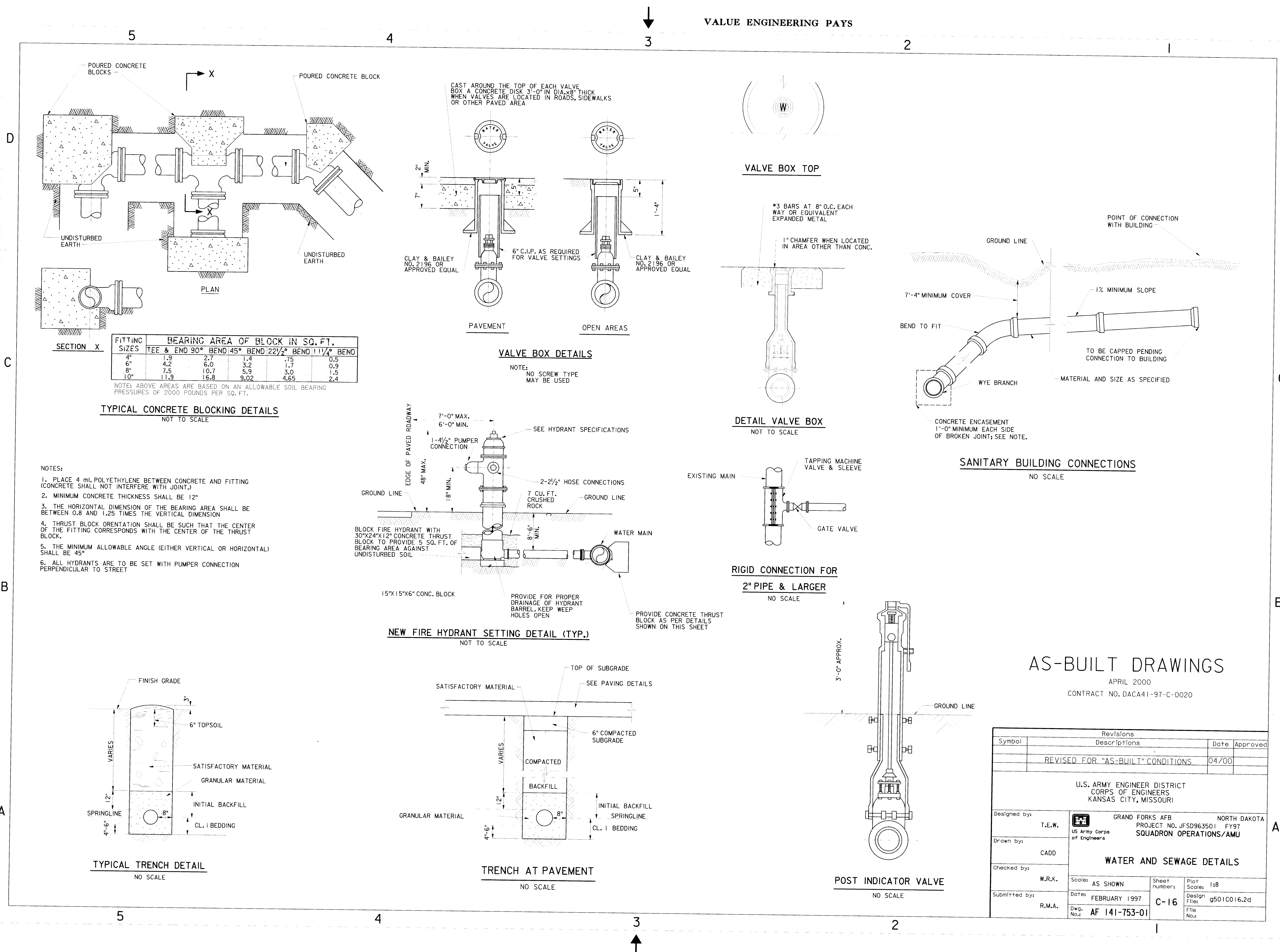
AS-BUILT DRAWINGS

APRIL 2000

CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	T.E.W. GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	CADD		
Checked by:	W.R.K.		
Submitted by:	R.M.A.		
Scale: AS SHOWN		Sheet number: C-15	Plot Scale: 1:8
Date: FEBRUARY 1997		Design File: g501C015.2d	File No.:
Dwg. No.: AF 141-753-01			

631-00- 156-22 C-15



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

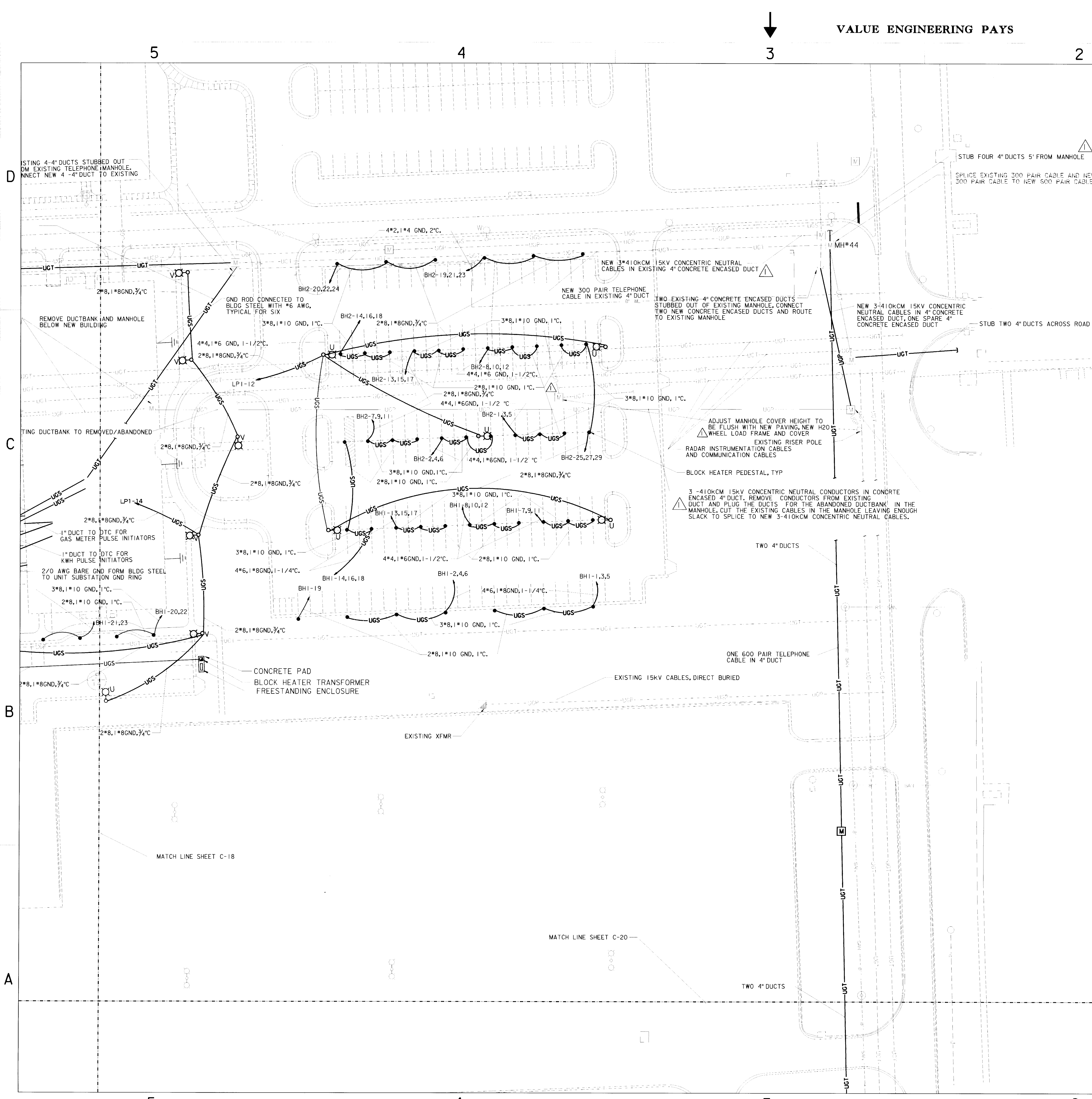
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	T.E.W.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	CADD		
Checked by:	W.R.K.		
Submitted by:	R.M.A.		
Scale:	AS SHOWN	Sheet numbers:	Plot Scale: 1:8
Date:	FEBRUARY 1997	Design File:	g501C016.2d
Dwg. No.:	AF 141-753-01	C-16	File No.:

AS-BUILT DRAWINGS

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Revisions			
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	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501, FY97 SQUADRON OPERATIONS/AMU
Drawn by:	RKB	ELECTRICAL SITE PLAN - OVERALL	
Checked by:	PEG	Scale: 60:1	Sheet numbers: C-17
Submitted by:	PEG	Date: FEBRUARY 1997	Plot Scale: 60:1
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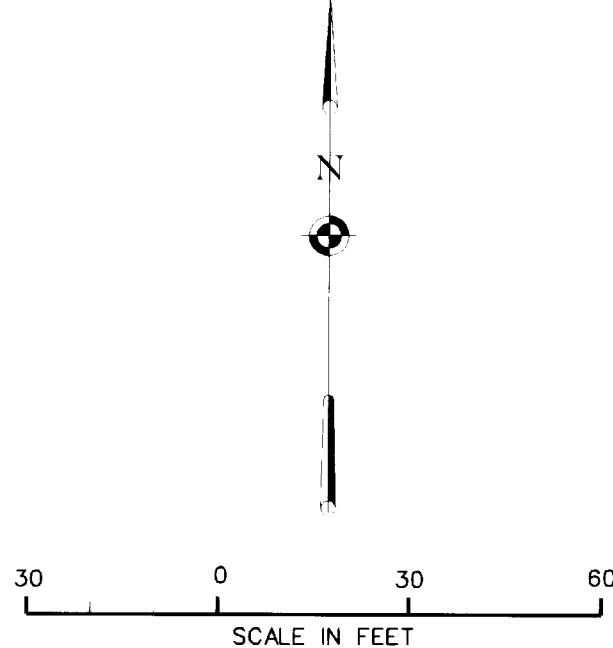
631-000- 156-24 C-17



- NOTES:**
- 1. ALL EXTERIOR LIGHTING CIRCUITS SHALL BE ROUTED THROUGH THE APPROPRIATE LIGHTING CONTACTOR. SEE EXTERIOR LIGHTING CONTROL DETAIL SHEET C-22. SEE SHEET E-1 FOR LIGHTING CONTACTOR LOCATIONS.
 - 2. SEE SHEET E-0 FOR LEGEND.
 - 3. WHERE REMOVAL OF ITEMS OR MATERIAL IS INDICATED, THE ITEMS OR MATERIAL SHALL BE DISPOSED OF PROPERLY EXCEPT TRANSFORMERS. TRANSFORMERS SHALL BE TURNED OVER TO THE CONTRACTING OFFICERS REPRESENTATIVE.
 - 4. SEE SHEET S-10 FOR TYPICAL PIPE PENETRATION THROUGH GRADE BEAMS FOR ALL CONDUITS ROUTED THROUGH GRADE BEAMS.
 - 5. CONDUITS ROUTED THROUGH SLAB-ON-GRADE SHALL BE SLEEVED WITH PLASTIC SCHEDULE 40 PIPE THAT IS LARGE ENOUGH TO ALLOW 1/4" BETWEEN THE OUTER WALL OF THE CONDUIT AND THE INNER WALL OF THE SLEEVE. FILL THE SPACE WITH FOAM CAULK BACKING AND CAULK WATERTIGHT.
 - 6. SEE FIXTURE SCHEDULE ON SHEET E-11, FIXTURE DETAILS ON SHEET E-14, AND SPECIFICATION SECTION 16415 FOR ADDITIONAL EXTERIOR LIGHTING INFORMATION.
 - 7. THE EXISTING RADAR AND INSTRUMENTATION CABLES THAT CROSS THE SITE CONSIST OF 9 RADAR CABLES, 1 RADIO CABLE, AND 3 PHONE CABLES (200 PAIR, 400 PAIR AND 25 PAIR) INSTALLED IN FOUR SEPARATE TRENCHES. THESE CABLES MUST REMAIN IN OPERATION UNTIL 1 AUGUST 1997, AT WHICH TIME THEY WILL BE ABANDONED IN PLACE. THESE CABLES MAY BE SURROUNDED BY SPLIT DUCT SLEEVES NO LARGER THAN 4" FOR THE ENTIRE LENGTH UNDER THE BUILDING AND LEFT IN PLACE WHILE CONSTRUCTING FOUNDATIONS. THE SLEEVES SHALL BE NO CLOSER THAN 1-1/2" TO ANY REINFORCING AND SHALL BE ABOVE THE BOTTOM LAYER OF REINFORCING. WHEN THE CABLES HAVE BEEN ABANDONED BY THE AIR FORCE, THE CONTRACTOR SHALL REMOVE THE CABLE PORTIONS THAT ARE BELOW THE BUILDING AND SEAL THE DUCT OPENINGS IN THE FOUNDATIONS WITH GROUT.
 - 8. THE COMMUNICATIONS DUCTBANKS, MANHOLES AND ALL ASSOCIATED EQUIPMENT (EXCEPT THE DUCTBANK ROUTE INTO THE BUILDING) SHALL BE COMPLETED WITHIN 45 DAYS AFTER NOTICE TO PROCEED. THE CONTRACTOR WILL ALLOW ACCESS TO THESE DUCTBANKS AND MANHOLES AS WELL AS EXISTING DUCTBANKS AND MANHOLES THROUGHOUT THE CONTRACT FOR INSTALLATION OF GOVERNMENT FURNISHED GOVERNMENT INSTALLED CABLES BY GOVERNMENT PERSONNEL OR OTHER CONTRACTORS. EXTENSION FOR ANY REASON OF THE 45 DAY TIME PERIOD FOR COMPLETION OF THE ABOVE DESCRIBED WORK SHALL CAUSE A CORRESPONDING EXTENSION OF THE 1 AUGUST 1997 DATE DEFINED IN NOTE 7.
 - 9. THE CONTRACTOR SHALL PHYSICALLY VERIFY THE SIZE OF THE EXISTING 15 kV CABLES BEFORE ORDERING ANY NEW CABLE THAT WILL BE SPLICED INTO THE EXISTING CABLES.

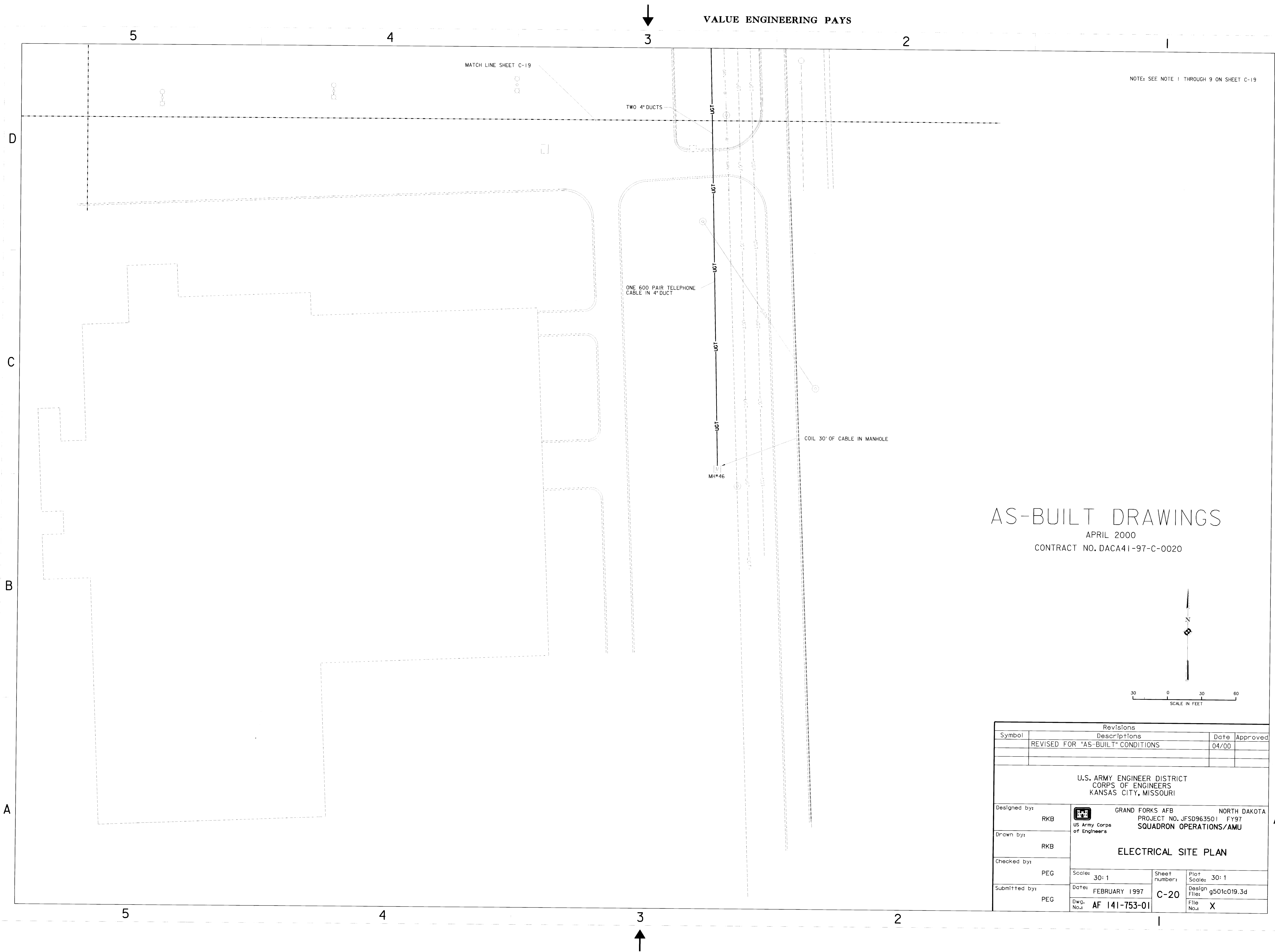
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



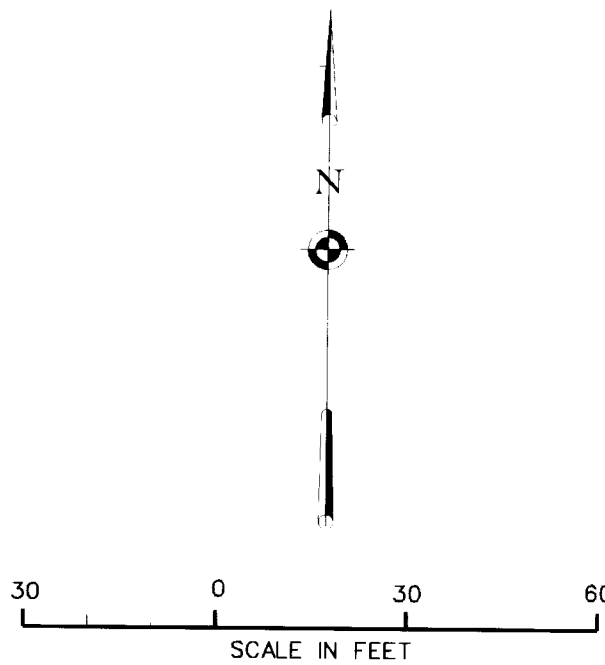
Revisions			
Symbol	Descriptions	Date	Approved
Δ	Amendment Changes	4-8-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU		
Drawn by:	RKB		
Checked by:	PEG		
Submitted by:	PEG		
Scale: 30: 1		Sheet number: C-19	Plot Scale: 30: 1
Date: FEBRUARY 1997		Design File: g501c019.3d	
Dwg. No.: AF 141-753-01		File No.: X	

631-00- 156-26 C-19



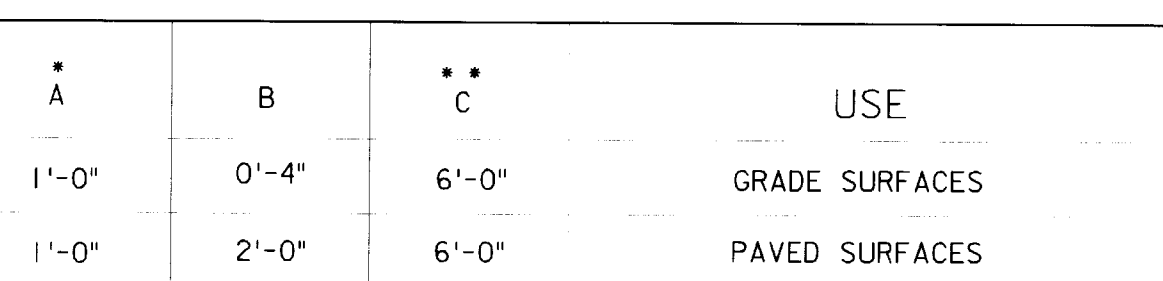
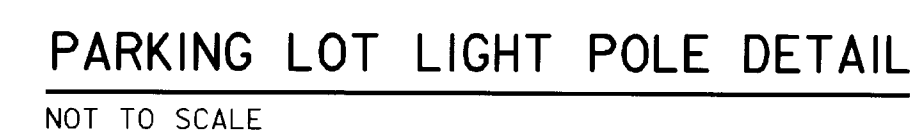
AS-BUILT DRAWINGS

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CONTRACT NO. DACA41-97-C-0020



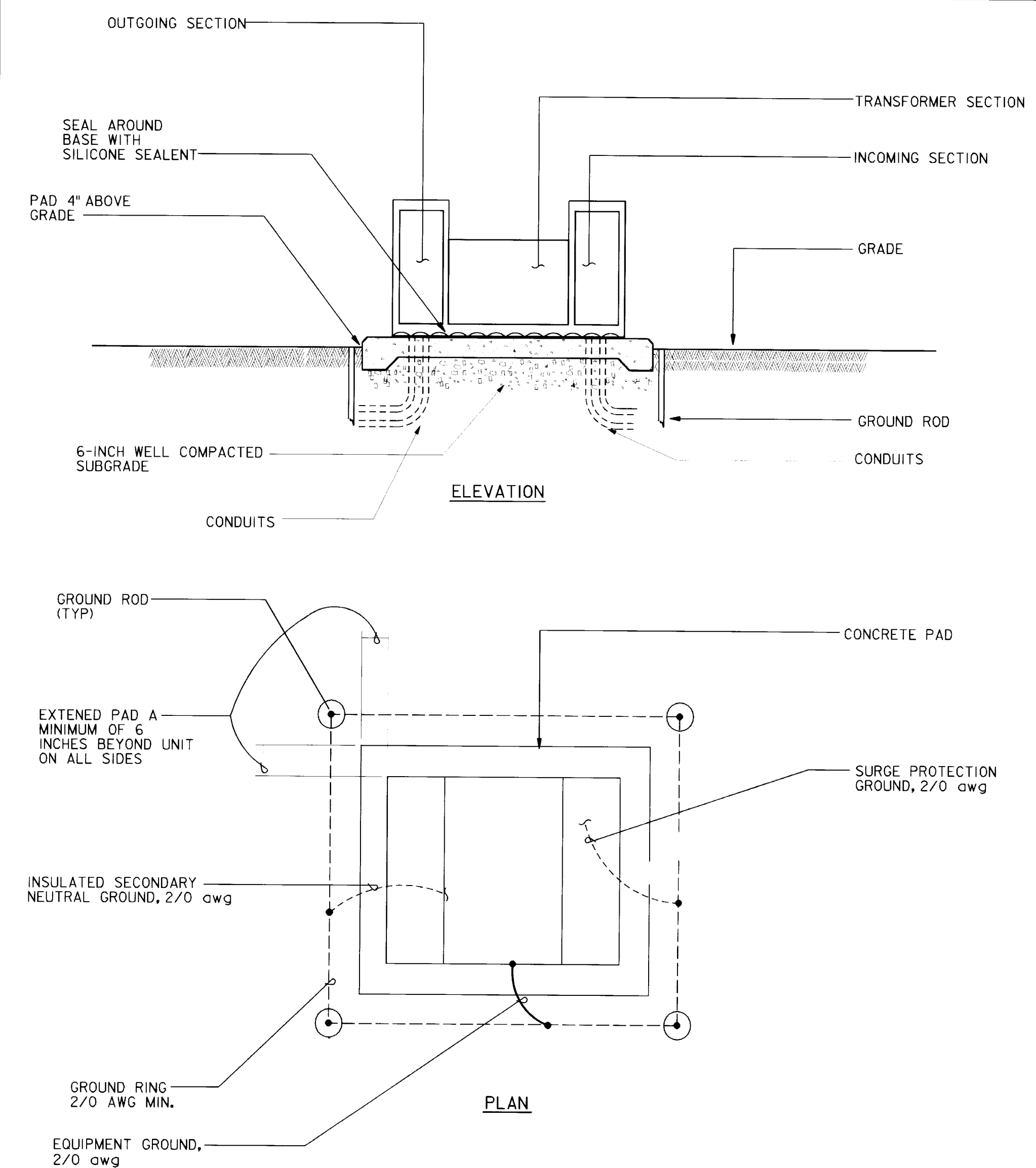
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	GRAND FORKS AFB NORTH DAKOTA		
	PROJECT NO. JFSD963501 FY97		
Drawn by:	SQUADRON OPERATIONS/AMU		
Checked by:	ELECTRICAL SITE PLAN		
	Scale: 30: 1	Sheet number:	Plot Scale: 30: 1
Submitted by:	Date: FEBRUARY 1997	C-20	
	Dwg. No.: AF 141-753-01	Design File:	g501c019.3d
		File No.:	X

631-000- 156-27 C-20

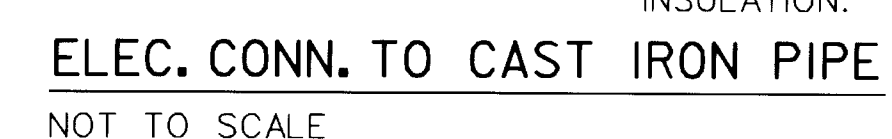
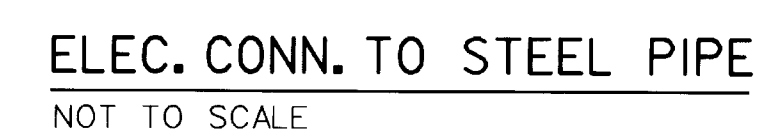


POLE BASE DETAIL FOR STREET, SIDEWALK
AND PARKING LOT LIGHT POLES

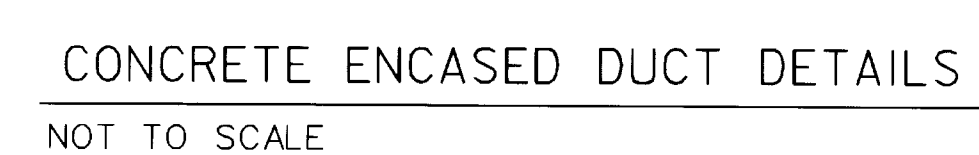
NOT TO SCALE




UNIT SUBSTATION GROUNDING DETAIL

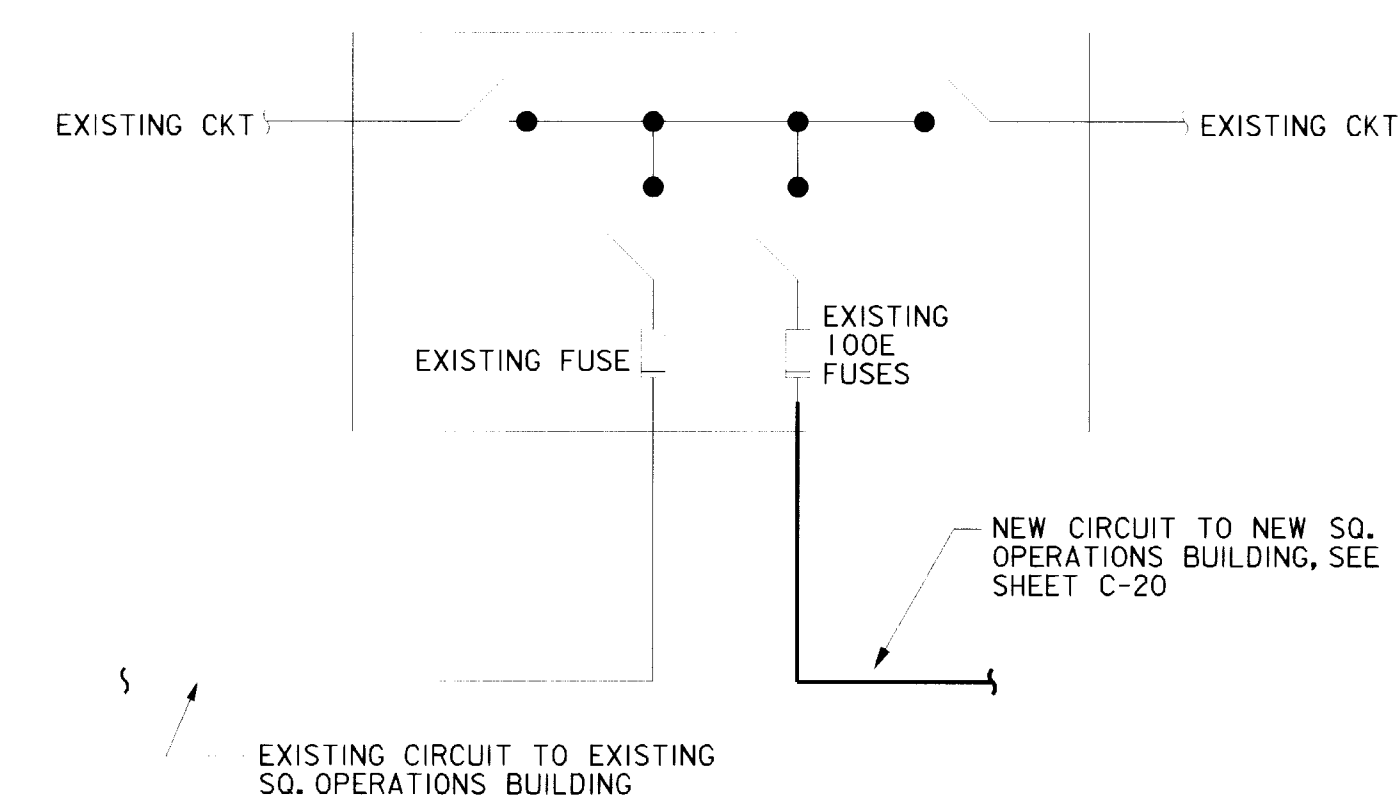
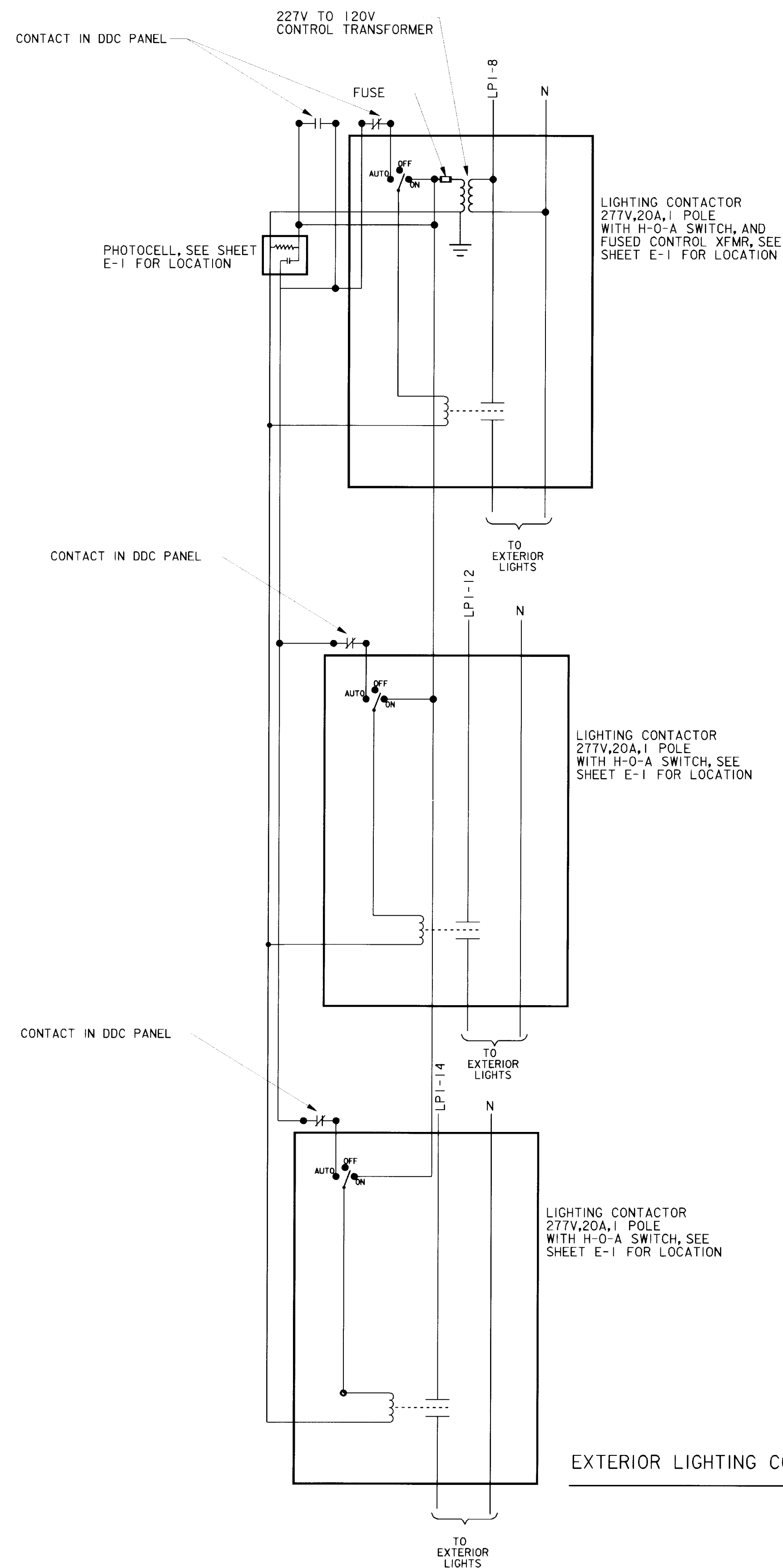


APRIL 2000
CONTRACT NO. DACA41-97-C-0020

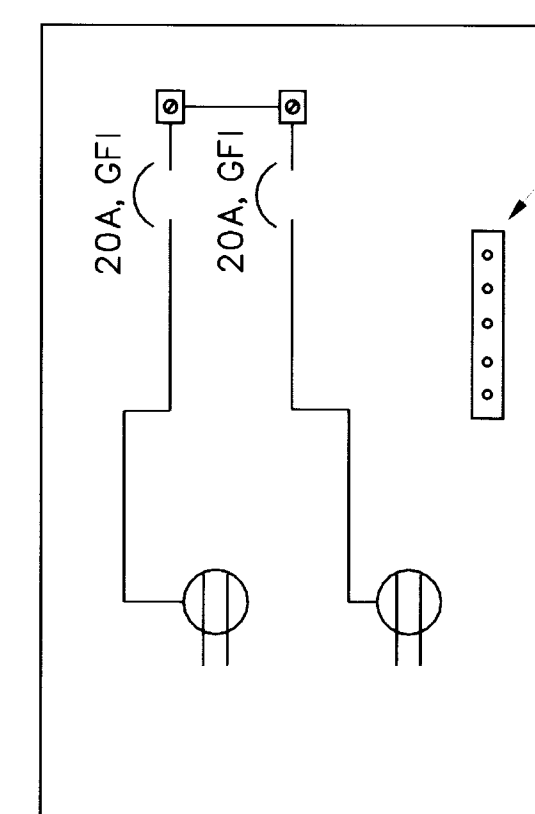


Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	 <p align="center"> GRAND FORKS AFB PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU </p>	NORTH DAKOTA	
B.G.		FY97	
Drawn by:			
B.G.	<p align="center">ELECTRICAL SITE DETAILS</p>		
Checked by:			
P.E.G.	Scale: NO SCALE	Sheet number: C-21	Plot Scale: 1:8
Submitted by:	Date:	Design File:	G500E021.2D
P.E.G.	Dwg. No. AF 141-753-01	File No.	X

631-000-156-28 C-21

3 ϕ PADMOUNTED SECTIONALIZING SWITCH SCHEMATIC

EXTERIOR LIGHTING CONTROL

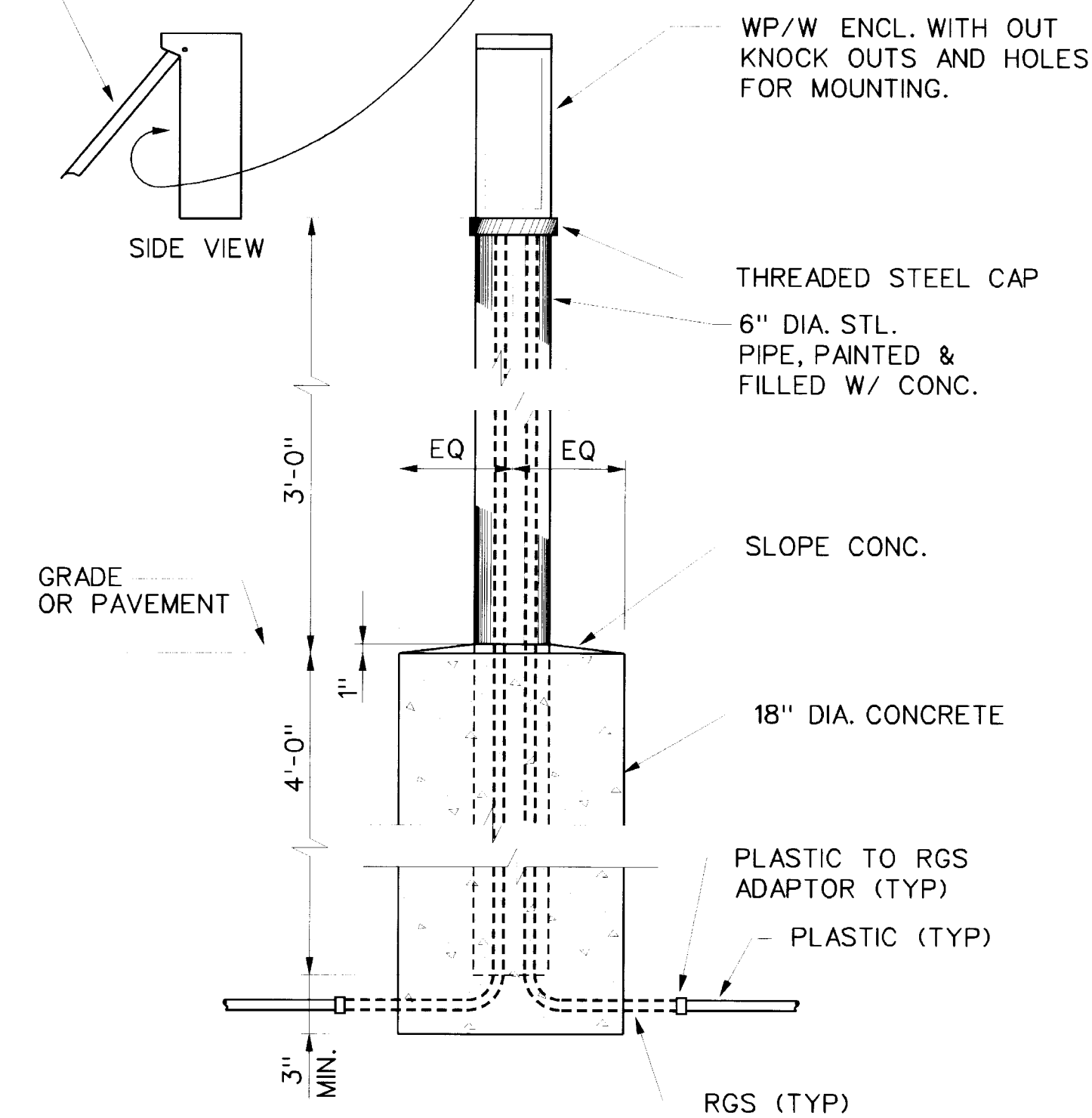


NOTE:
TWO DUPLEX 20A RECEPTACLES AND TWO 20A GFI CKT. BREAKERS SHALL BE MOUNTED ON THE FACE PLATE.

FRONT FACE PLATE

HINGED DOOR COVER
RATED FOR ACTIVE USE
DURING WET CONDITIONS.

SIDE VIEW

BLOCK HEATER PEDESTAL
NOT TO SCALE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	B.G.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	B.G.	ELECTRICAL SITE DETAILS	
Checked by:	P.E.G.	Scale: NO SCALE	Sheet number: C-22
Submitted by:	P.E.G.	Date:	Plot Scale: 1:8
		Dwg. No.: AF 141-753-01	Design File: G500E022.2D
			File No.: X

631-000-156-29 C-22

5

4

3

2

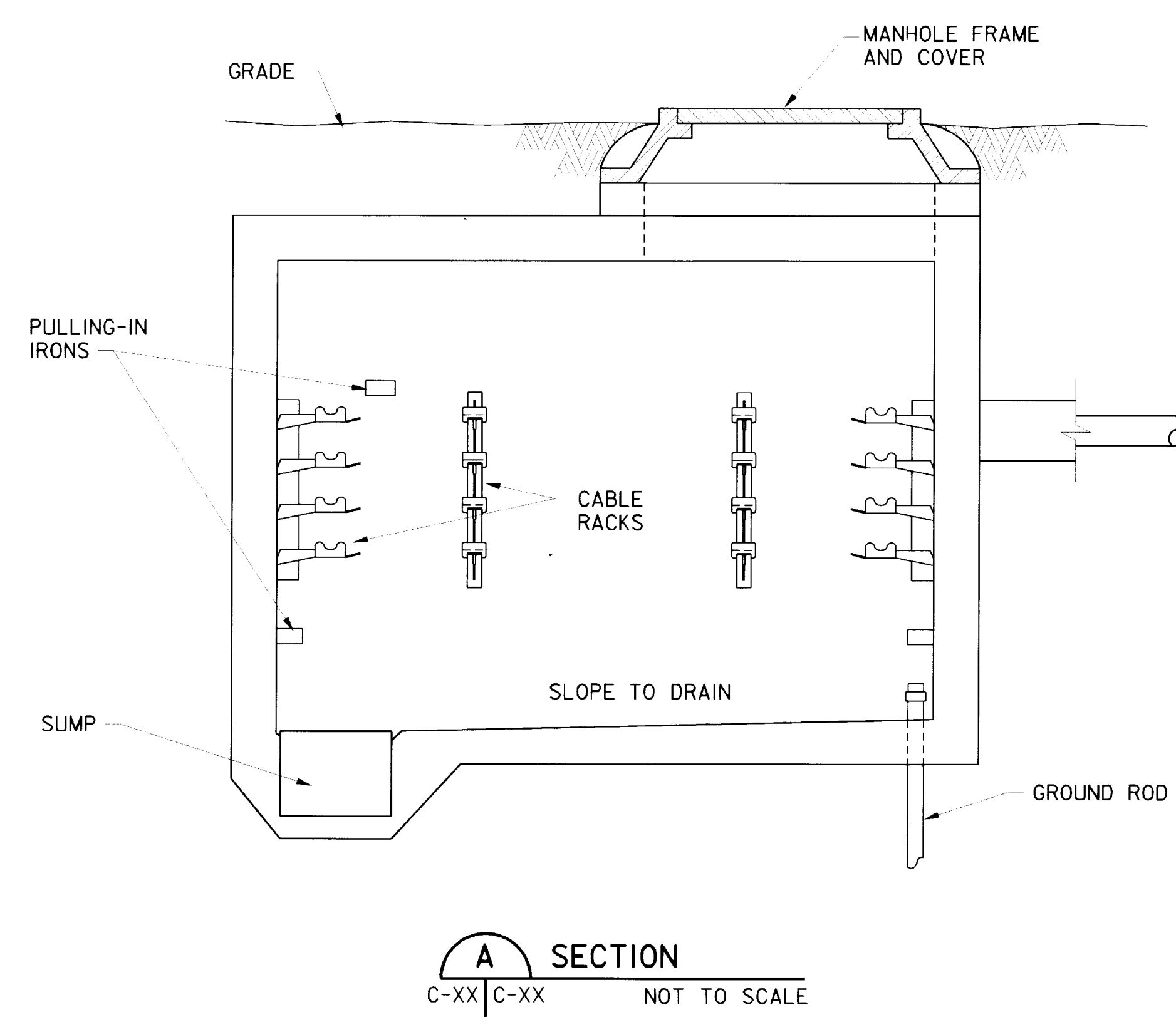
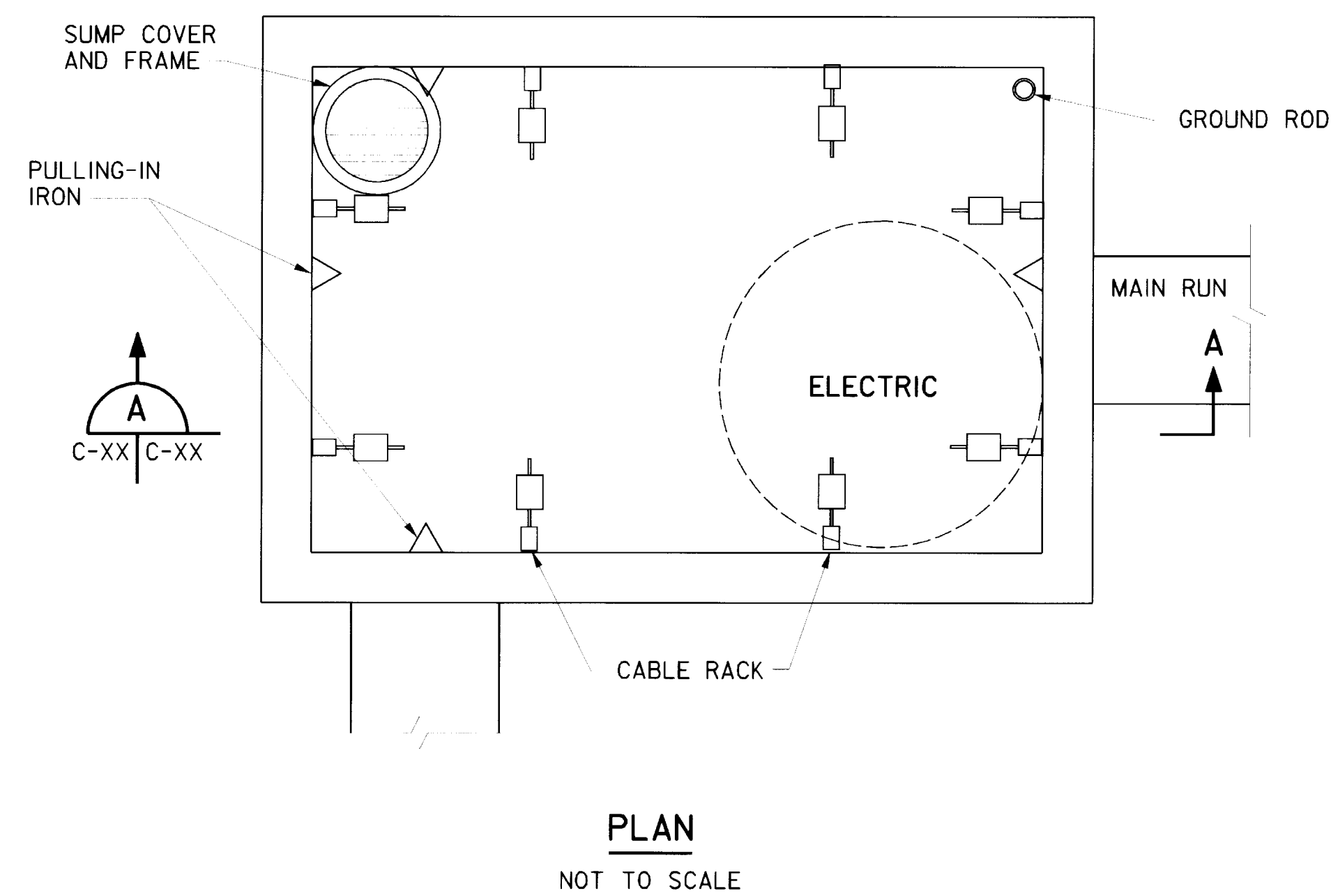
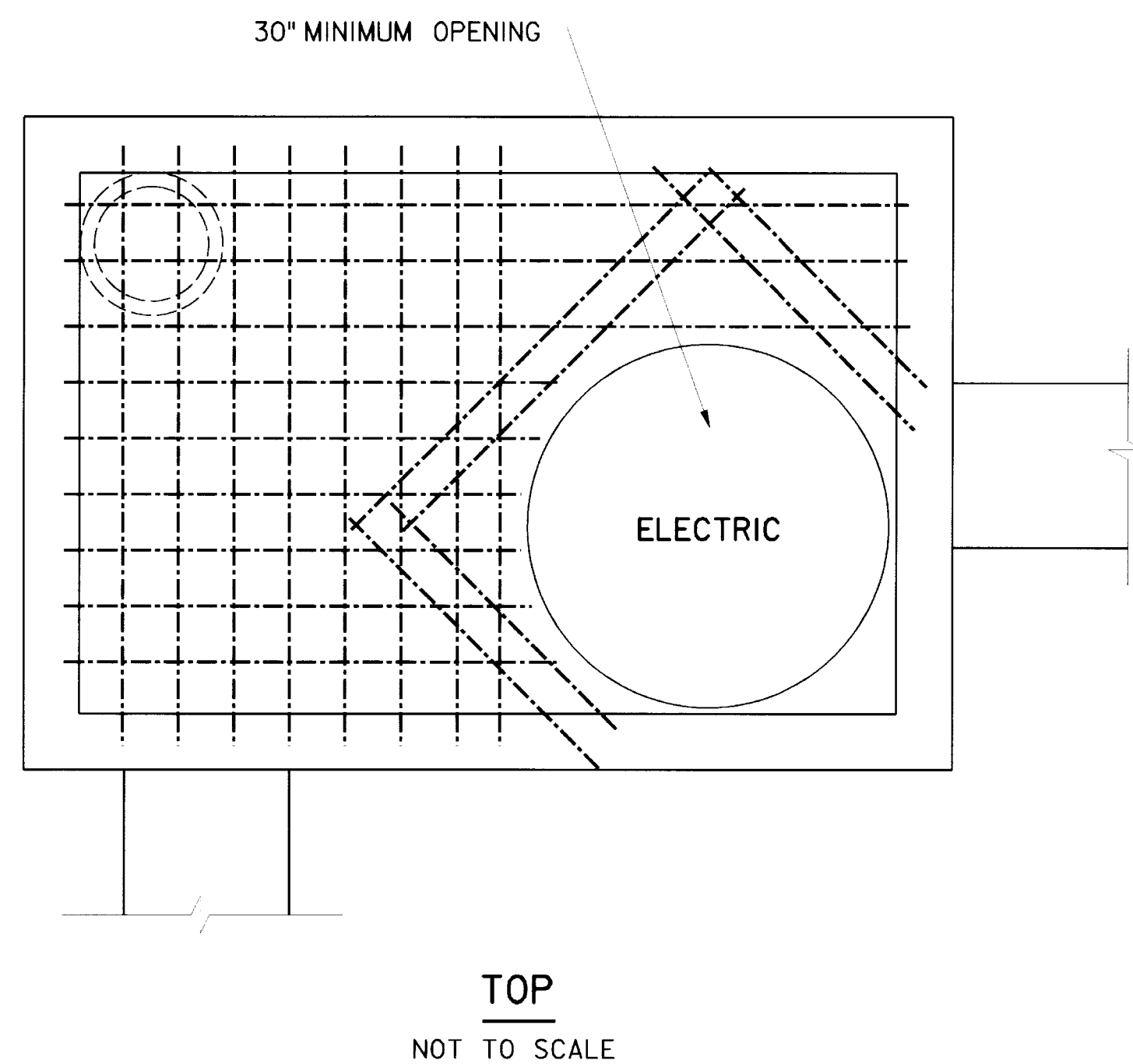
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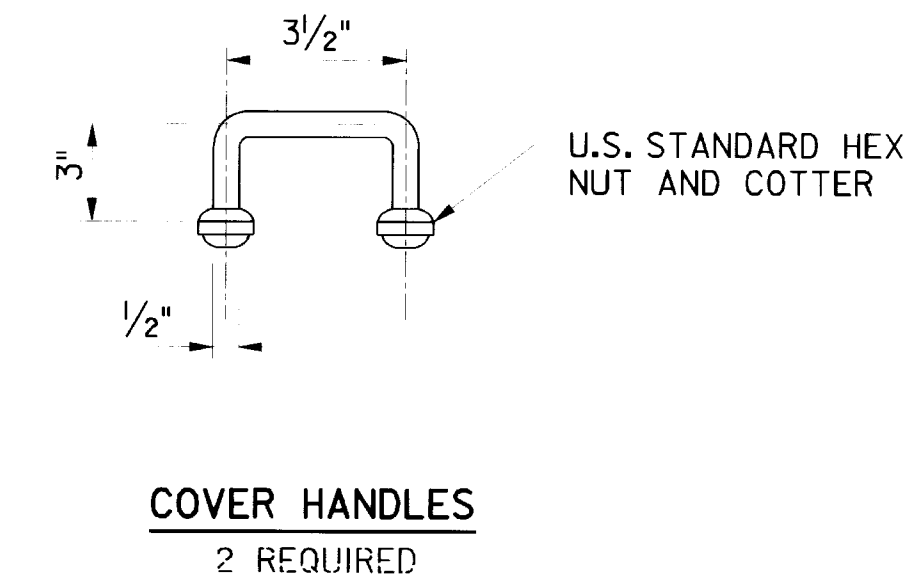
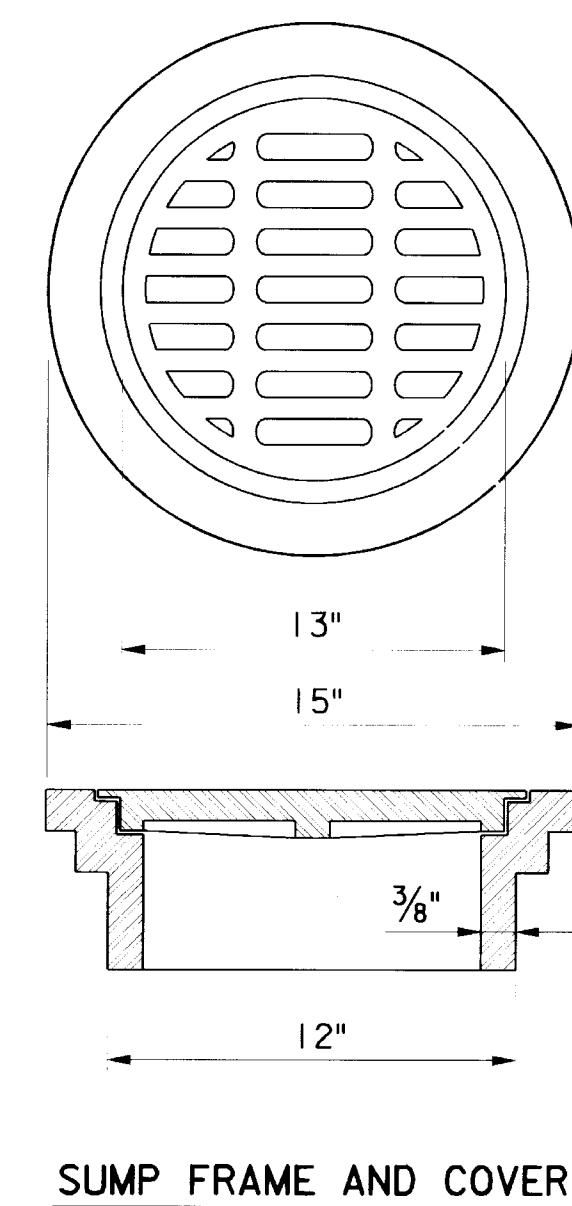
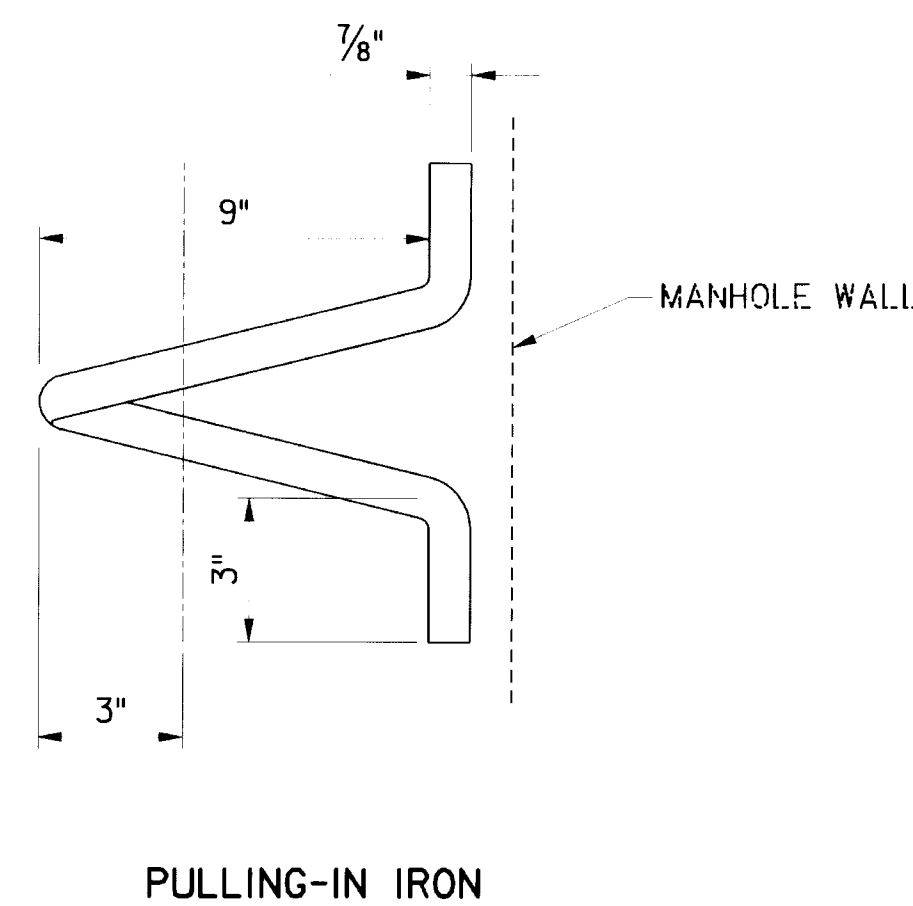
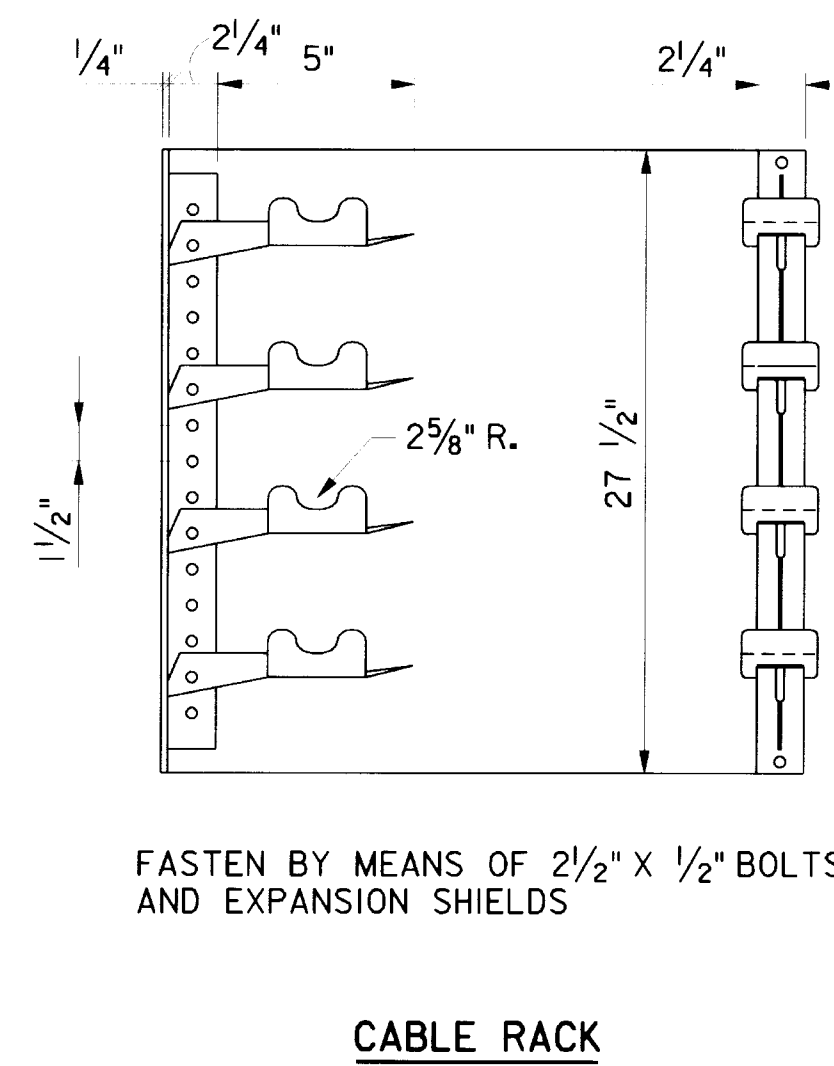
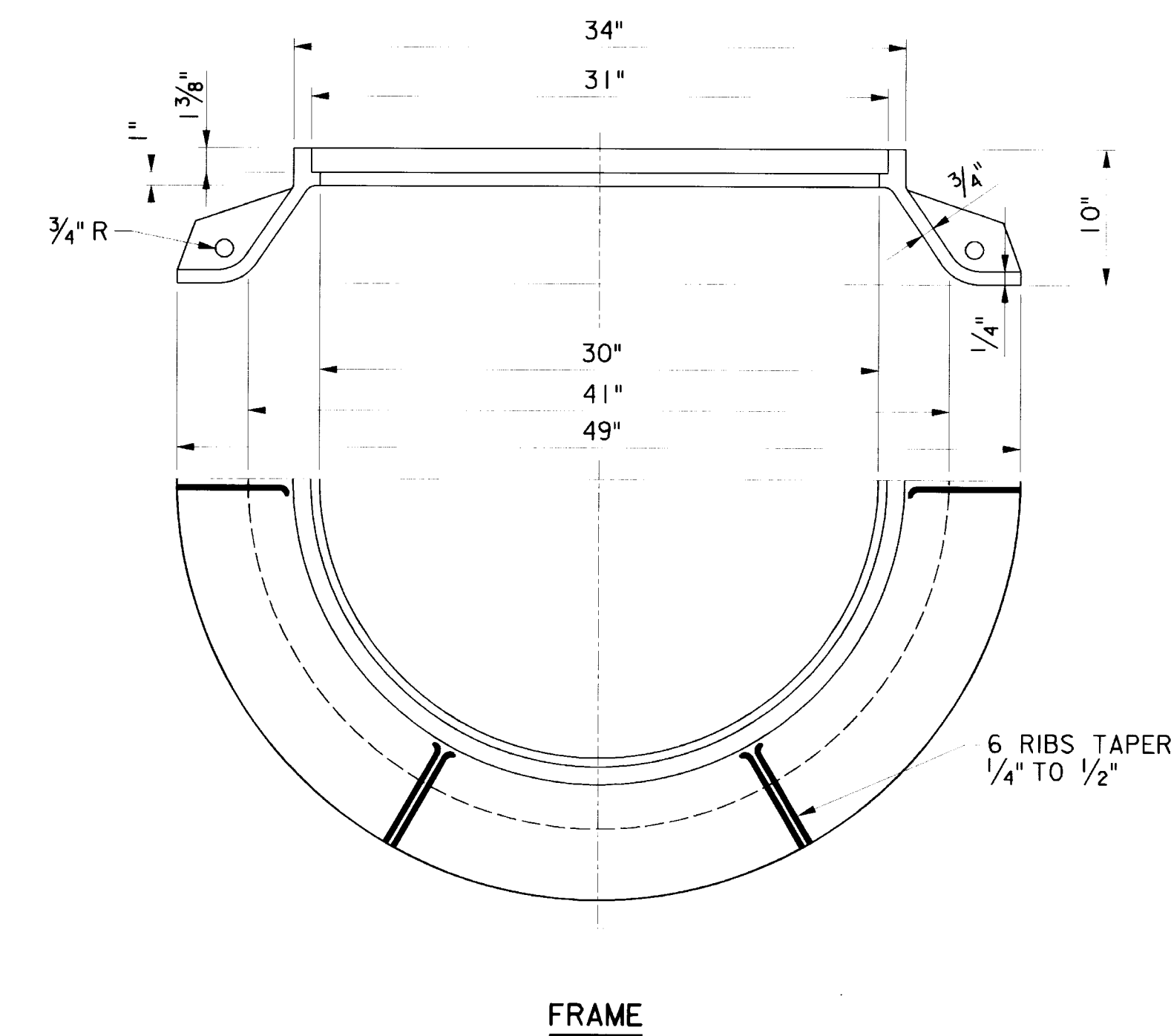
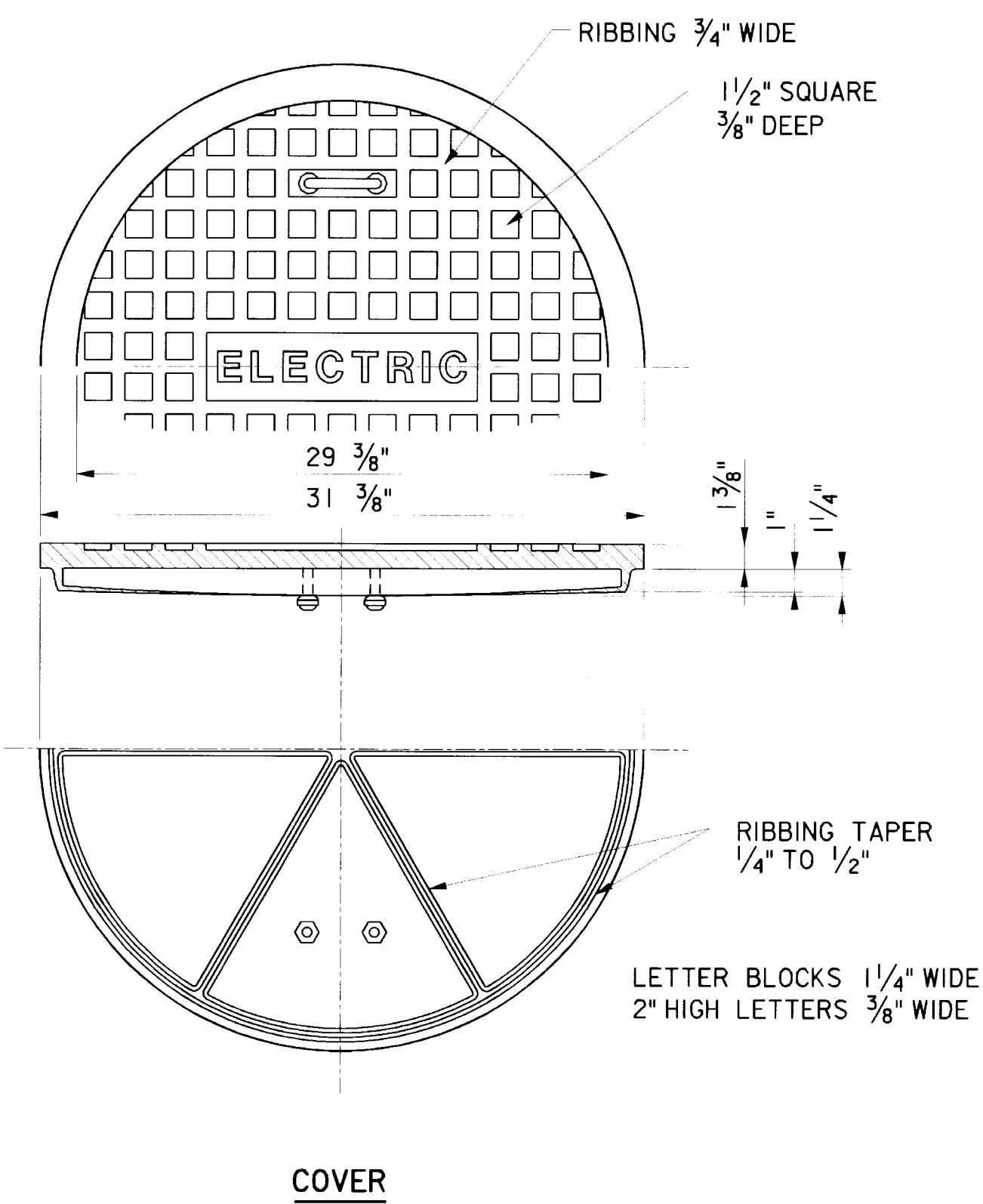
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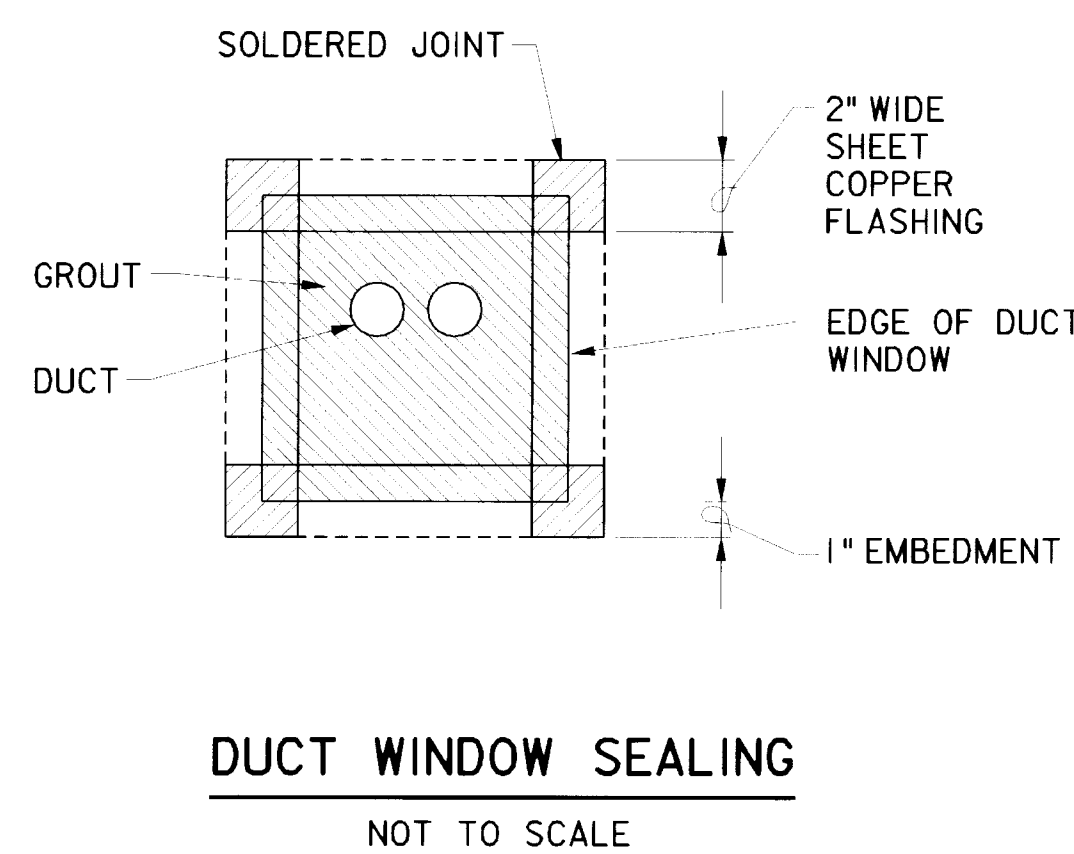
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CONSTRUCTION REQUIREMENTS			
CLEAR MINIMUM INSIDE DIMENSIONS FOR INSTALLATION AND MAINTENANCE PURPOSES			
HEIGHT	LENGTH	WIDTH	SUMP DEPTH
6 FEET	6 FEET	4 FEET	1 FOOT
MINIMUM CONCRETE THICKNESS			
MANHOLE WALLS, TOP, AND FLOOR		SUMP WALLS AND FLOOR	
6 INCHES		4 INCHES	
MINIMUM REINFORCING			
1. BARS WILL BE A MINIMUM OF NO. 4 ROUND DEFORMED.			
2. WALLS AND FLOOR WILL HAVE BARS AT 12 INCHES MINIMUM ON CENTERS WITH A MINIMUM 12 INCH HOOK AT CORNERS AND INTERSECTIONS.			
3. THE TOP WILL HAVE BARS INSTALLED AS SHOWN AT 4 INCHES ON CENTER MINIMUM LATERALLY AND LONGITUDINALLY AS APPROPRIATE, EXCEPT THAT AT OPENINGS ALSO PROVIDE AN ADDITIONAL BAR AT A TWO-INCH SPACING AND TWO DIAGONAL BARS, EACH WAY AT 45° TO AND LOCATED ABOVE LATERAL OR LONGITUDINAL BARS.			



MANHOLE HARDWARE
NOT TO SCALE



AS-BUILT DRAWINGS APRIL 2000 CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	B.G.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	B.G.	ELECTRICAL/COMMUNICATIONS MANHOLE DETAILS	
Checked by:	P.E.G.	Scale: NO SCALE	Sheet numbers: 1:8
Submitted by:	P.E.G.	Date:	Design File: G500E023.2D
		Dwg. No.: AF 141-753-01	File No.: X

631-00-156-30 C-23

↓
3




D

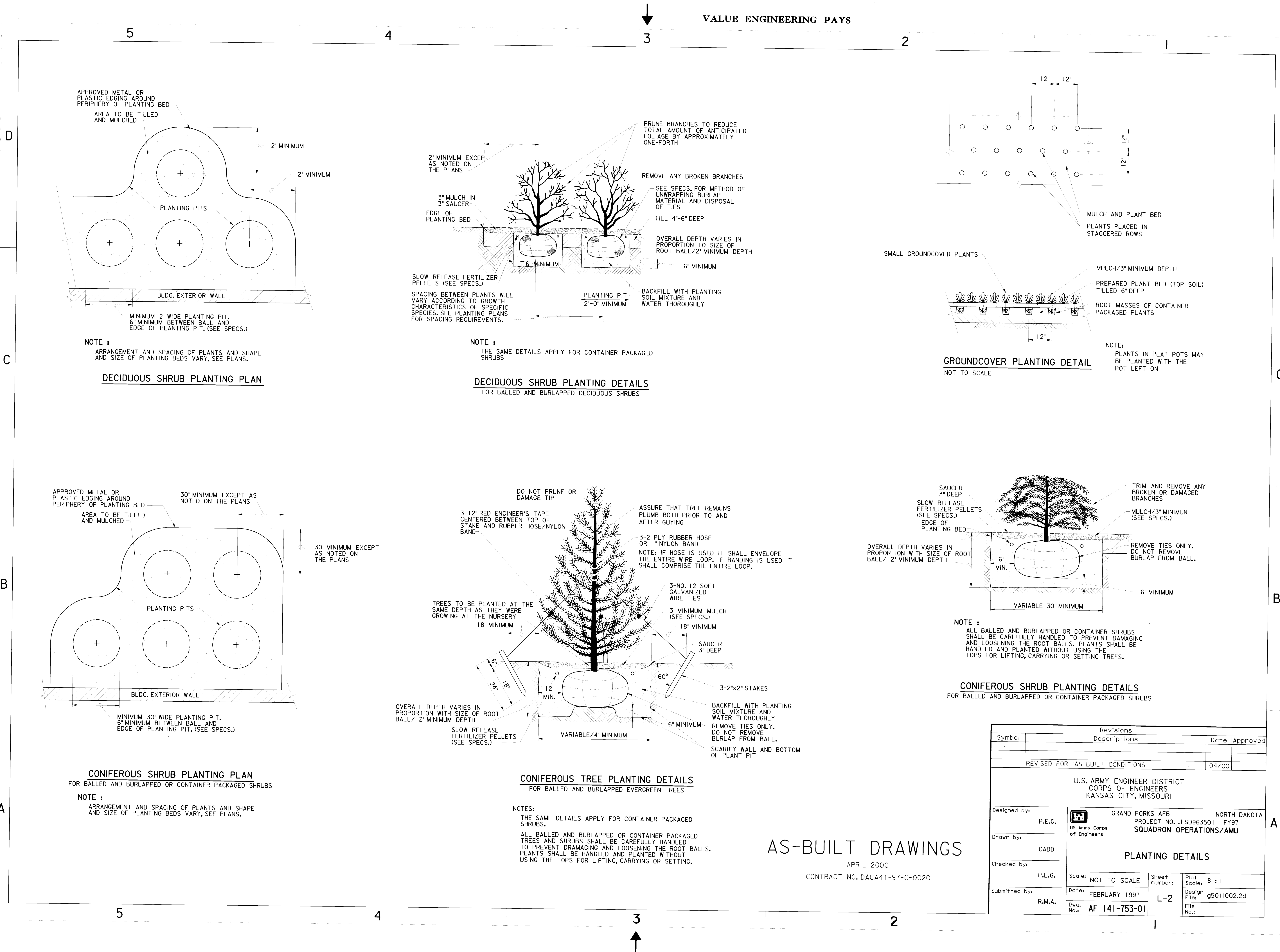
C

B

A

* SHADE AND ORNAMENTAL TREES SHALL BE UNIFORMLY WELL BRANCHED. SHADE TREES SHALL BE A MINIMUM HEIGHT OF 8 FEET AFTER PRUNING. ORNAMENTAL TREES 5 1/2 FEET.

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
P-14	MODIFY SOUTH PARKING LOT & EXTERIOR DOOR	05-29-98	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:		 <p>GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU</p>	
P.E.G.			
Drawn by:		<p>LANDSCAPE PLAN</p>	
R.A.C.			
Checked by:			
P.E.G.			
Submitted by:		<p>Scale: 1" = 30'</p>	<p>Sheet number: _____</p>
R.M.A.		<p>Date: FEBRUARY 1997</p>	<p>Plot Scale: 30:1</p>
		<p>Dwg. No.: AF 141-753-01</p>	<p>Design File: g5011001.3d</p>
			<p>File No.: _____</p>
			<p>L-1</p>

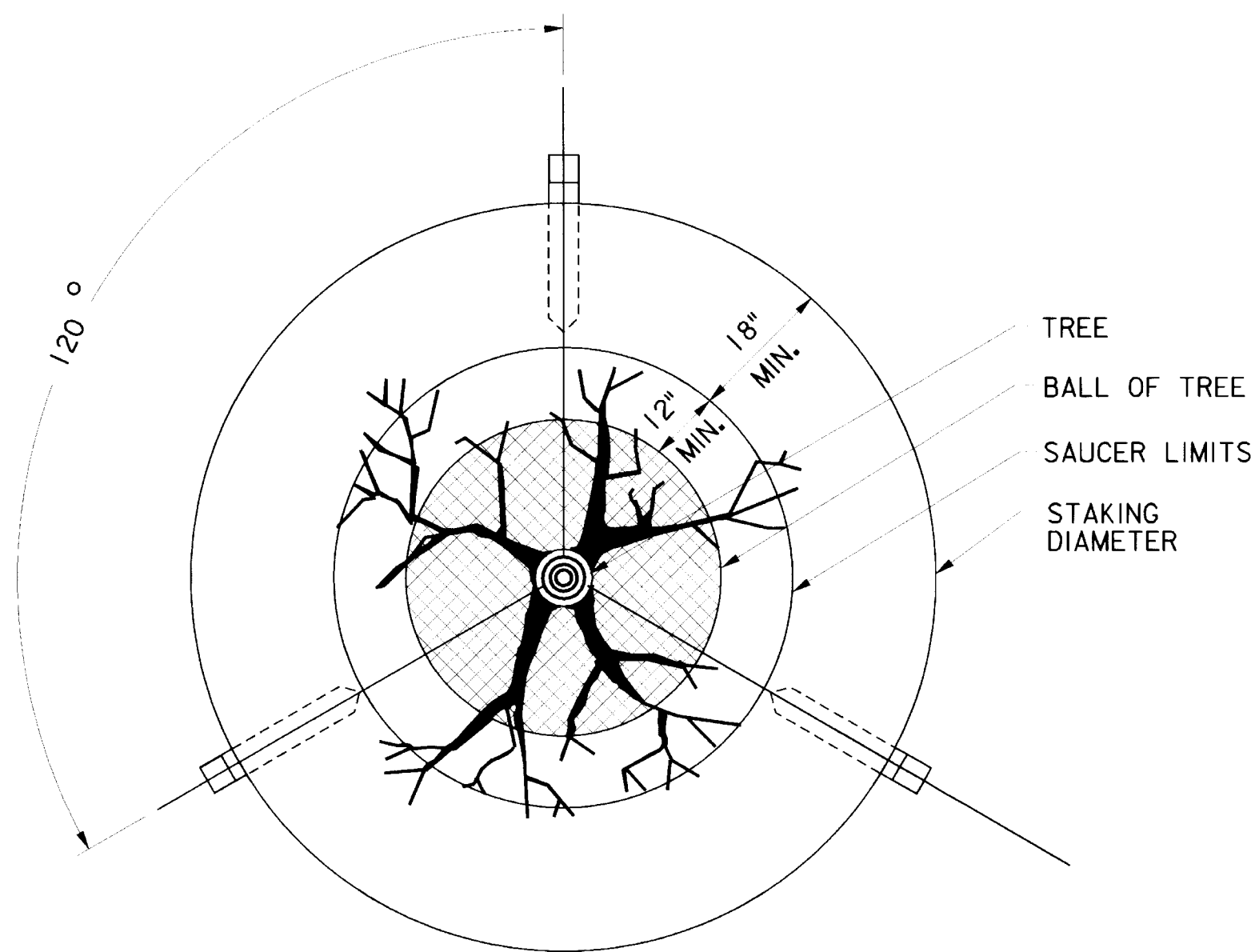


631-000-156-32 L-2

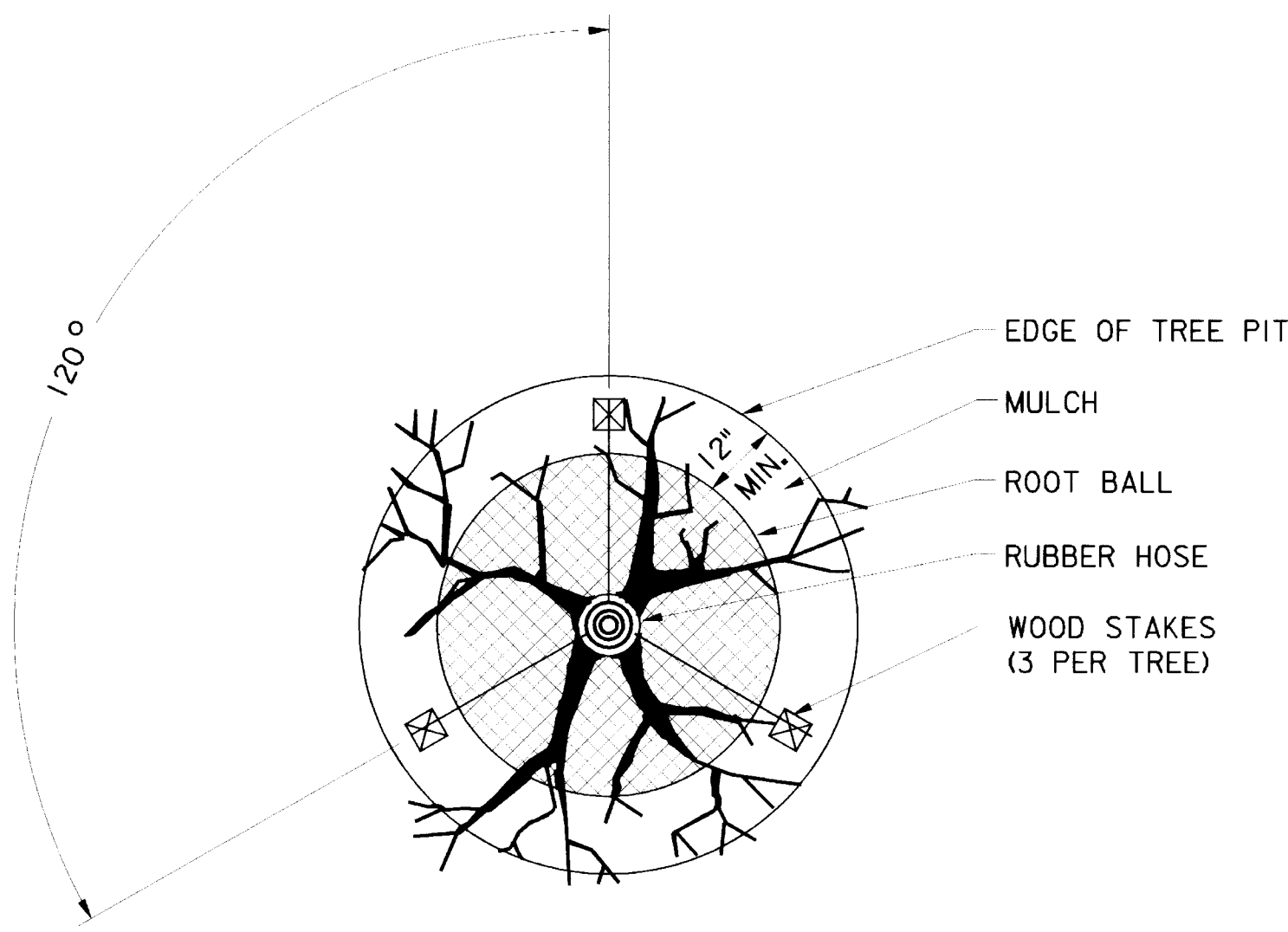
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

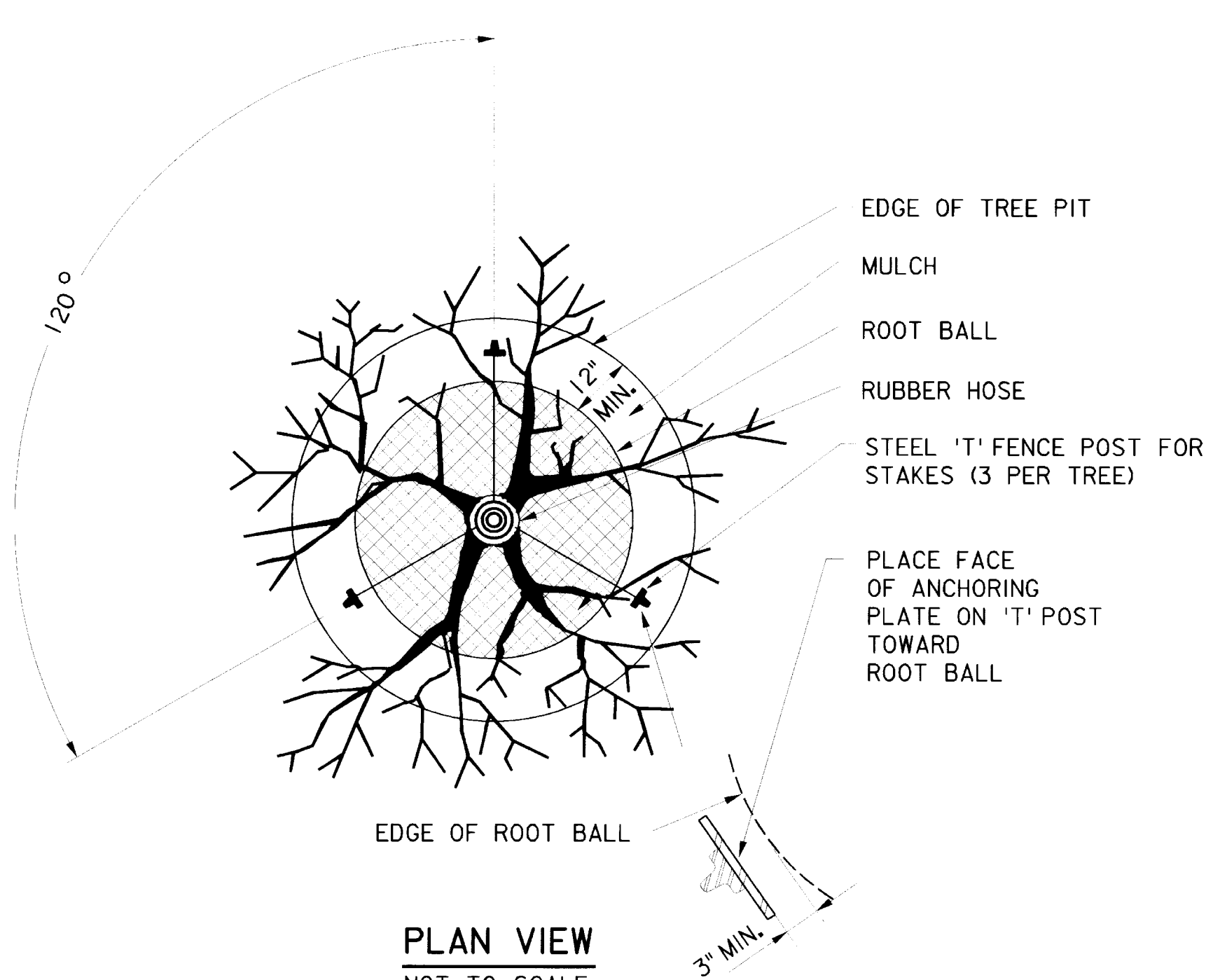
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	P.E.G.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	CADD	PLANTING DETAILS	
Checked by:	P.E.G.	Scale: NOT TO SCALE	Sheet number: 8 of 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g5011002.2d
		Dwg. No. AF 141-753-01	File No.:



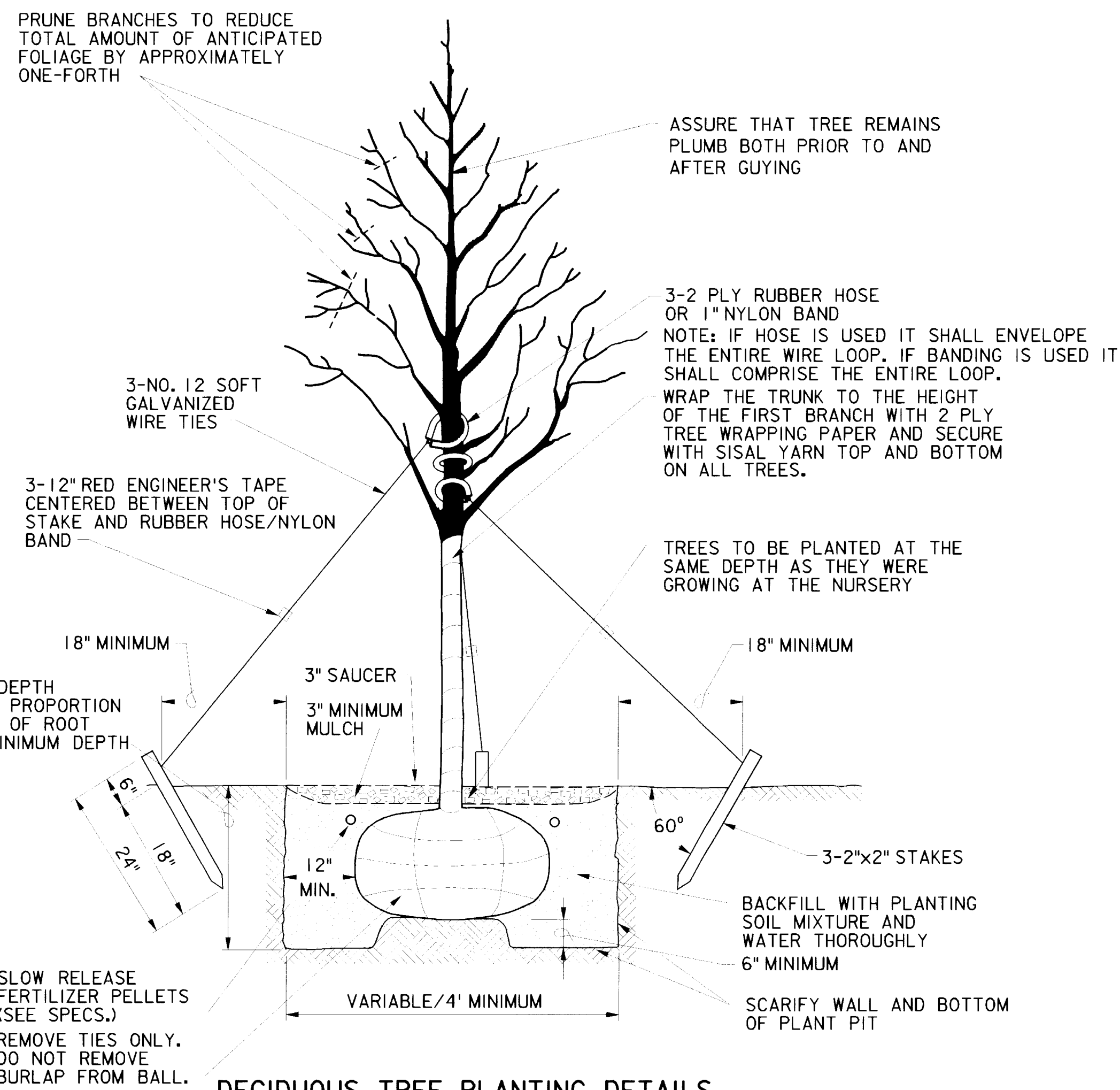
TREE STAKING AND BRACING DETAIL
PLAN VIEW
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

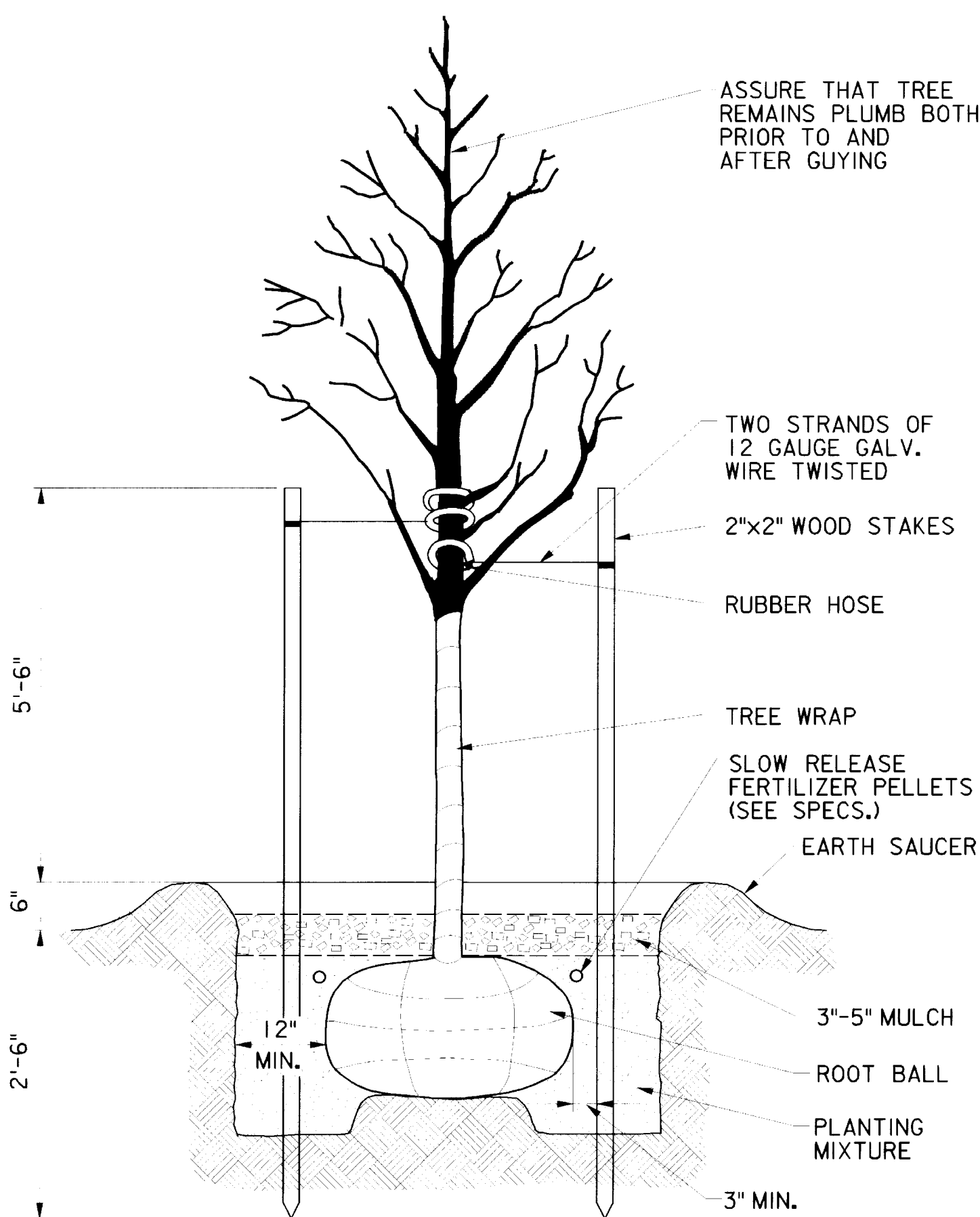


PLAN VIEW
NOT TO SCALE



DECIDUOUS TREE PLANTING DETAILS
FOR BALLED AND BURLAPPED DECIDUOUS TREES

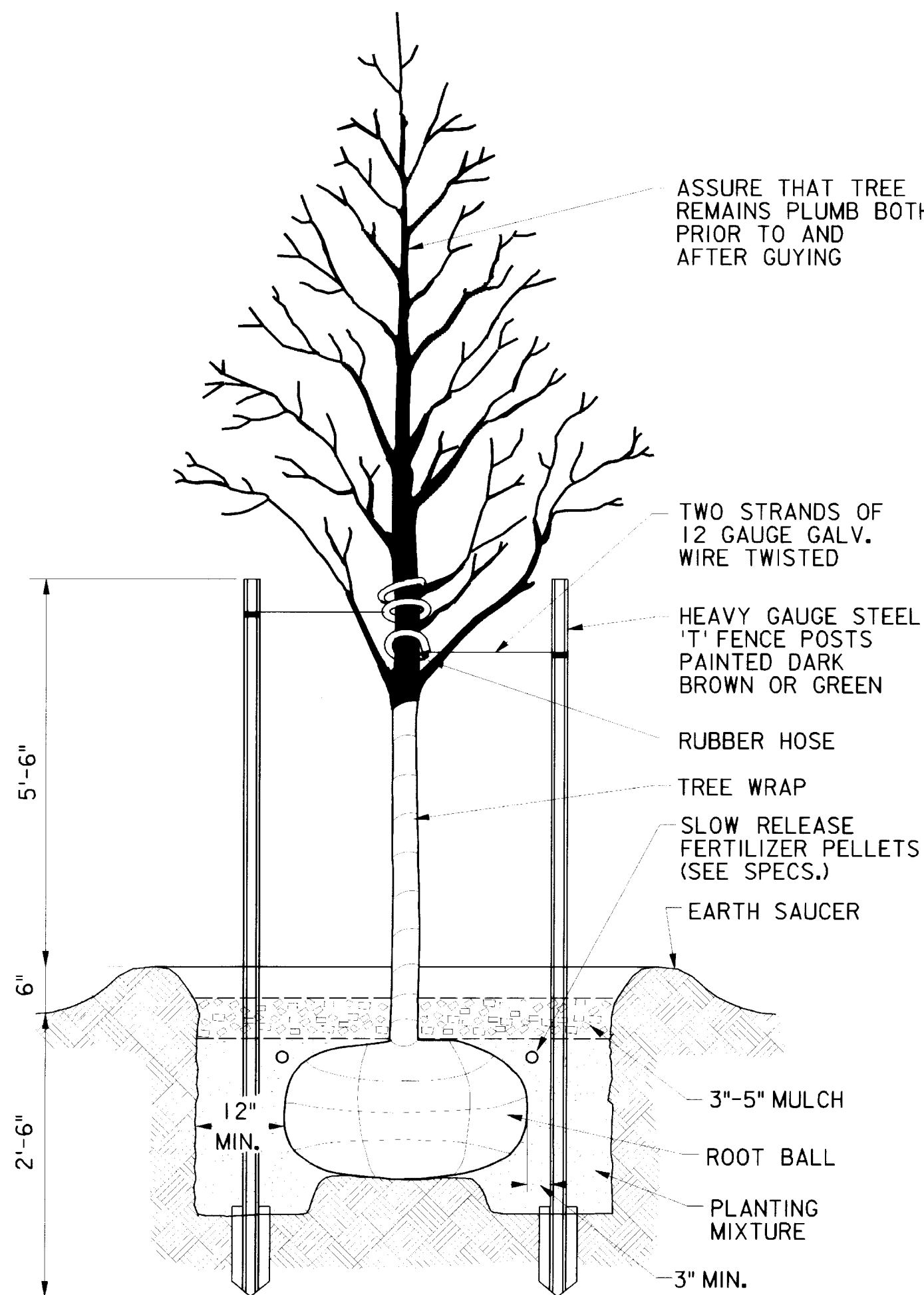
NOTE :
ALL BALLED AND BURLAPPED TREES SHALL BE CAREFULLY HANDLED TO PREVENT DAMAGING AND LOOSENING THE BALLS. PLANTS SHALL BE HANDLED AND PLANTED WITHOUT USING THE TOPS FOR LIFTING, CARRYING OR SETTING TREES.



SECTION

**PLANTING DETAIL FOR ORNAMENTAL
AND SHADE TREES 2 1/2" CALIPER AND LESS**
OPTIONAL METHOD B
NOT TO SCALE

NOTE :
ALL BALLED AND BURLAPPED TREES SHALL BE CAREFULLY HANDLED TO PREVENT DAMAGING AND LOOSENING THE BALLS. PLANTS SHALL BE HANDLED AND PLANTED WITHOUT USING THE TOPS FOR LIFTING, CARRYING OR SETTING TREES.



SECTION

**PLANTING DETAIL FOR TREES
GREATER THAN 2 1/2" CALIPER**
NOT TO SCALE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	P.E.G.	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU
Drawn by:	CADD	PLANTING DETAILS	
Checked by:	P.E.G.	Scale: NO SCALE	Sheet number: 8 : 1
Submitted by:	R.M.A.	Date: FEBRUARY 1997	Design File: g5011003.2d
	Dwg. No.: AF 141-753-01	L-3	File No.:


631-00- 156-33 L-3

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3



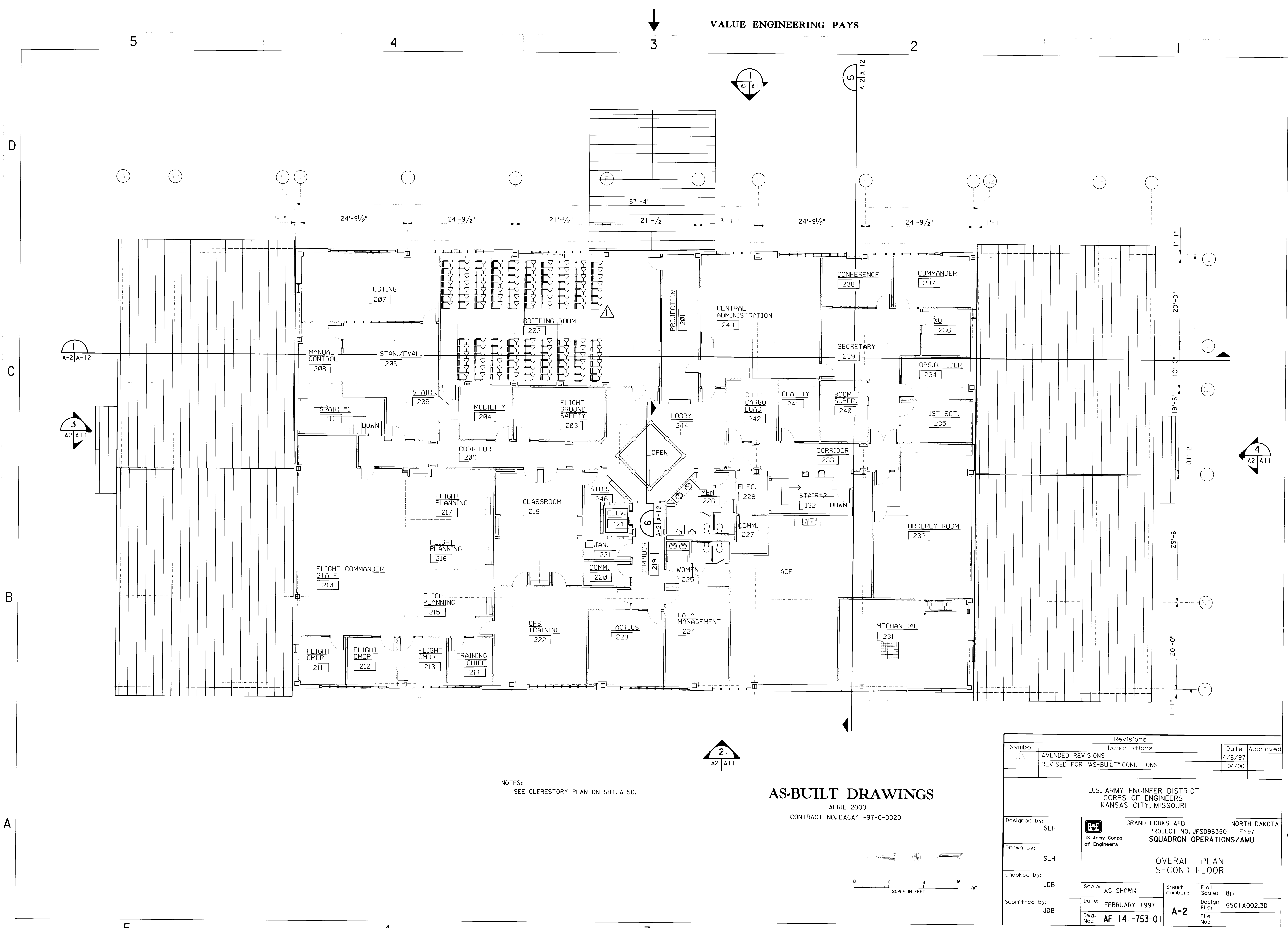
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions				
Symbol	Descriptions	Date	Approved	
①	AMENDED REVISIONS	4/8/97		
P-14	GENERAL REVISIONS	5/29/98		
	REVISED FOR "AS-BUILT" CONDITIONS	04/00		

<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>				
Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU		
SLH		<p align="center">OVERALL PLAN FIRST FLOOR</p>		
SLH				
Checked by:	JDB	Scale: AS SHOWN Date: FEBRUARY 1997 Dwg. No. AF 141-753-01	Sheet number: A-1	Plot Scale: 8:1 Design File: G501A001.3D File No.
Submitted by:	JDB			

P
14

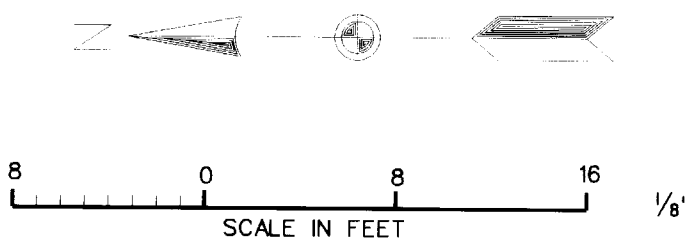
VALUE ENGINEERING PAYS



NOTES:
SEE CLERESTORY PLAN ON SHT. A-50.

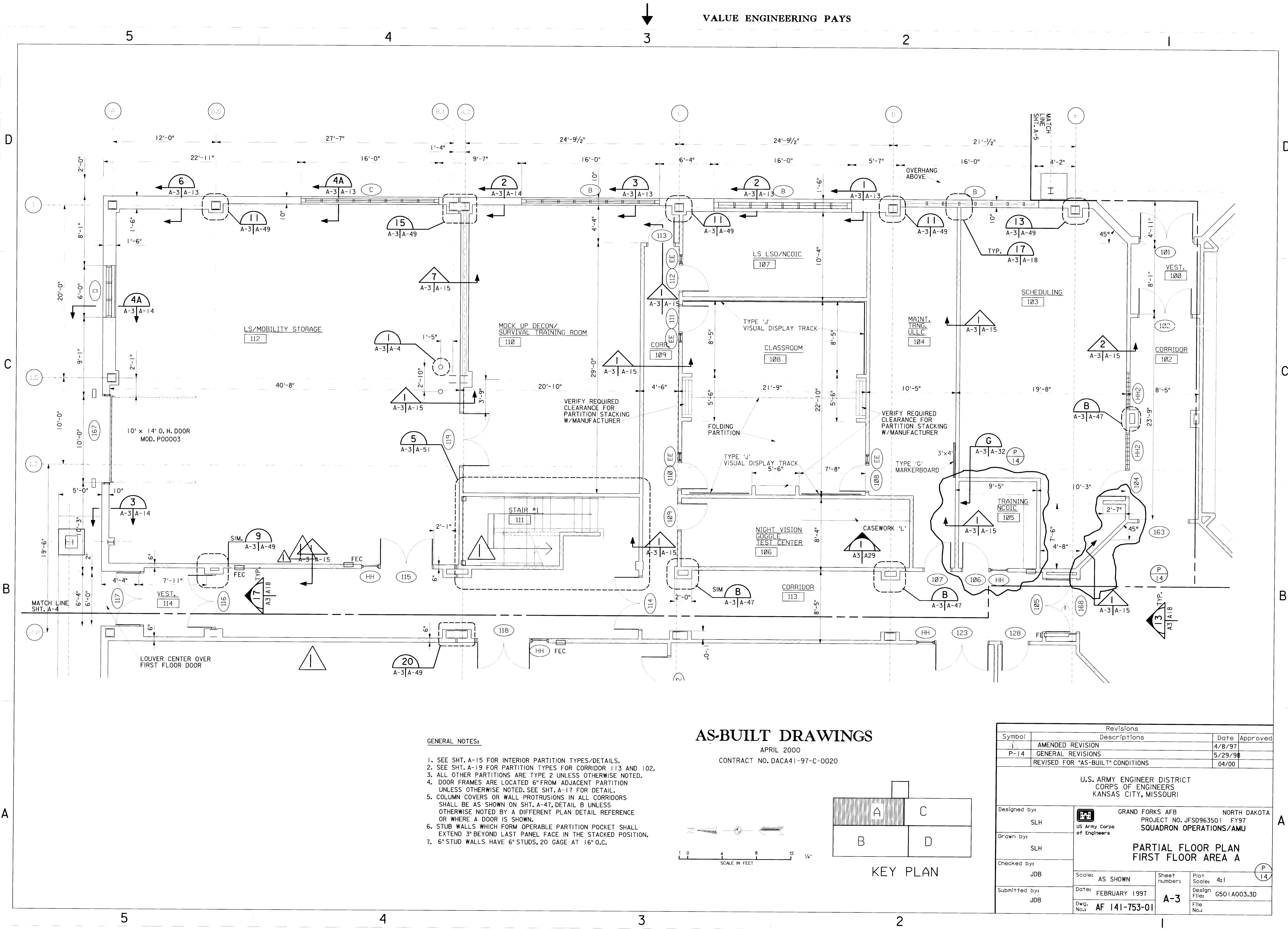
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISIONS	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	SLH	OVERALL PLAN SECOND FLOOR	
Checked by:	JDB	Scale: AS SHOWN	Sheet number: 8:1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G501A002.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000- 156-35 A-2

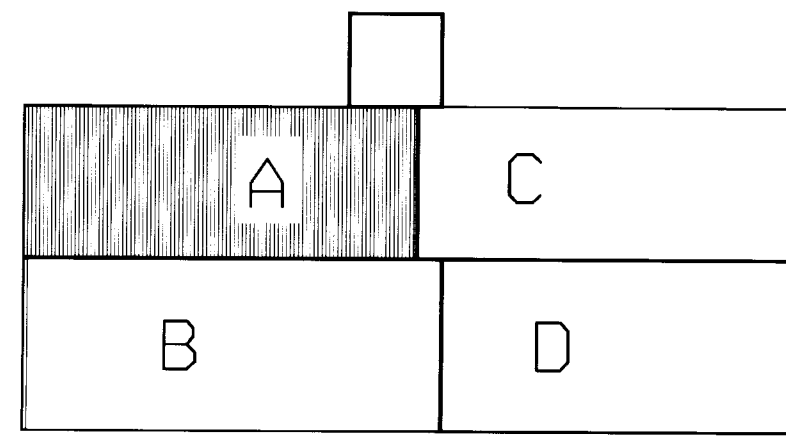
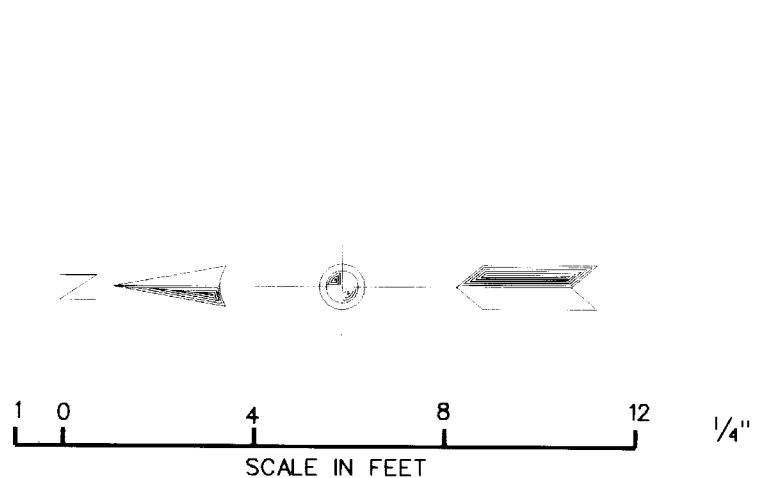


GENERAL NOTES:

1. SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
2. SEE SHT. A-19 FOR PARTITION TYPES FOR CORRIDOR 113 AND 102.
3. ALL OTHER PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED.
4. DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
5. COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.
6. STUB WALLS WHICH FORM OPERABLE PARTITION POCKET SHALL EXTEND 3" BEYOND LAST PANEL FACE IN THE STACKED POSITION.
7. 6" STUD WALLS HAVE 6" STUDS, 20 GAGE AT 16" O.C.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

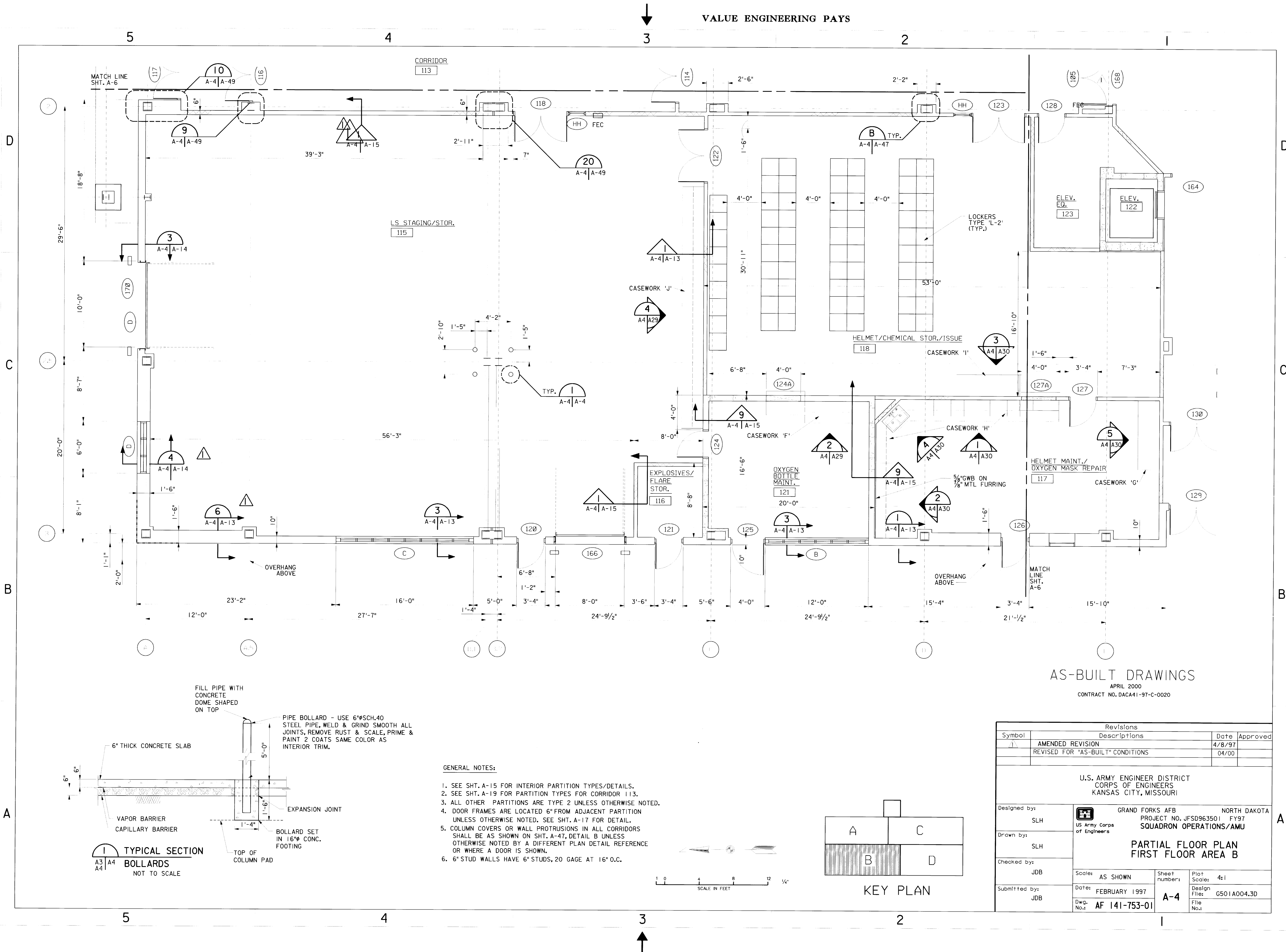


KEY PLAN

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: SLH	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: SLH	PARTIAL FLOOR PLAN FIRST FLOOR AREA A		
Checked by: JDB	Scale: AS SHOWN	Sheet number: A-3	Plot Scale: 4:1
Submitted by: JDB	Date: FEBRUARY 1997	Design File: G501A003.3D	File No.:
Dwg. No.:	AF 141-753-01		

VALUE ENGINEERING PAYS



AS-BUILT DRAWINGS

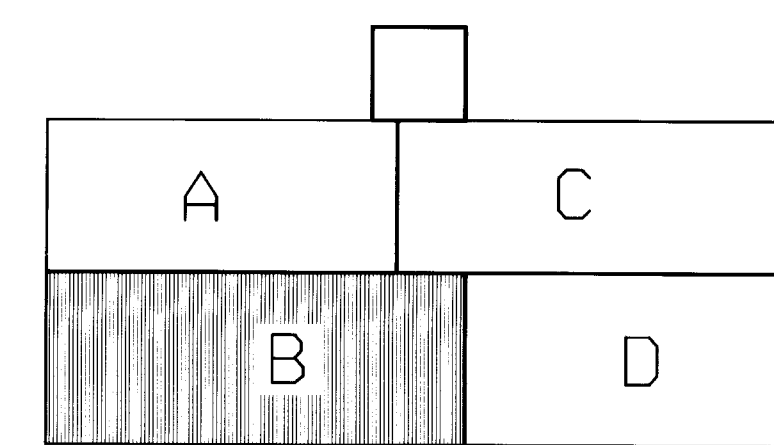
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB, North Dakota	
Drawn by:	SLH	US Army Corps of Engineers	
Checked by:	JDB	PROJECT NO. JFSD963501, FY97	
Submitted by:	JDB	SQUADRON OPERATIONS/AMU	
PARTIAL FLOOR PLAN FIRST FLOOR AREA B		Scale: AS SHOWN	Sheet number: A-4
		Date: FEBRUARY 1997	Plot Scale: 4:1
		Dwg. No.: AF 141-753-01	Design File: G501A004.3D
			File No.:

GENERAL NOTES:

- SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
- SEE SHT. A-19 FOR PARTITION TYPES FOR CORRIDOR 113.
- ALL OTHER PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED.
- DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
- COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.
- 6" STUD WALLS HAVE 6" STUDS, 20 GAGE AT 16" O.C.

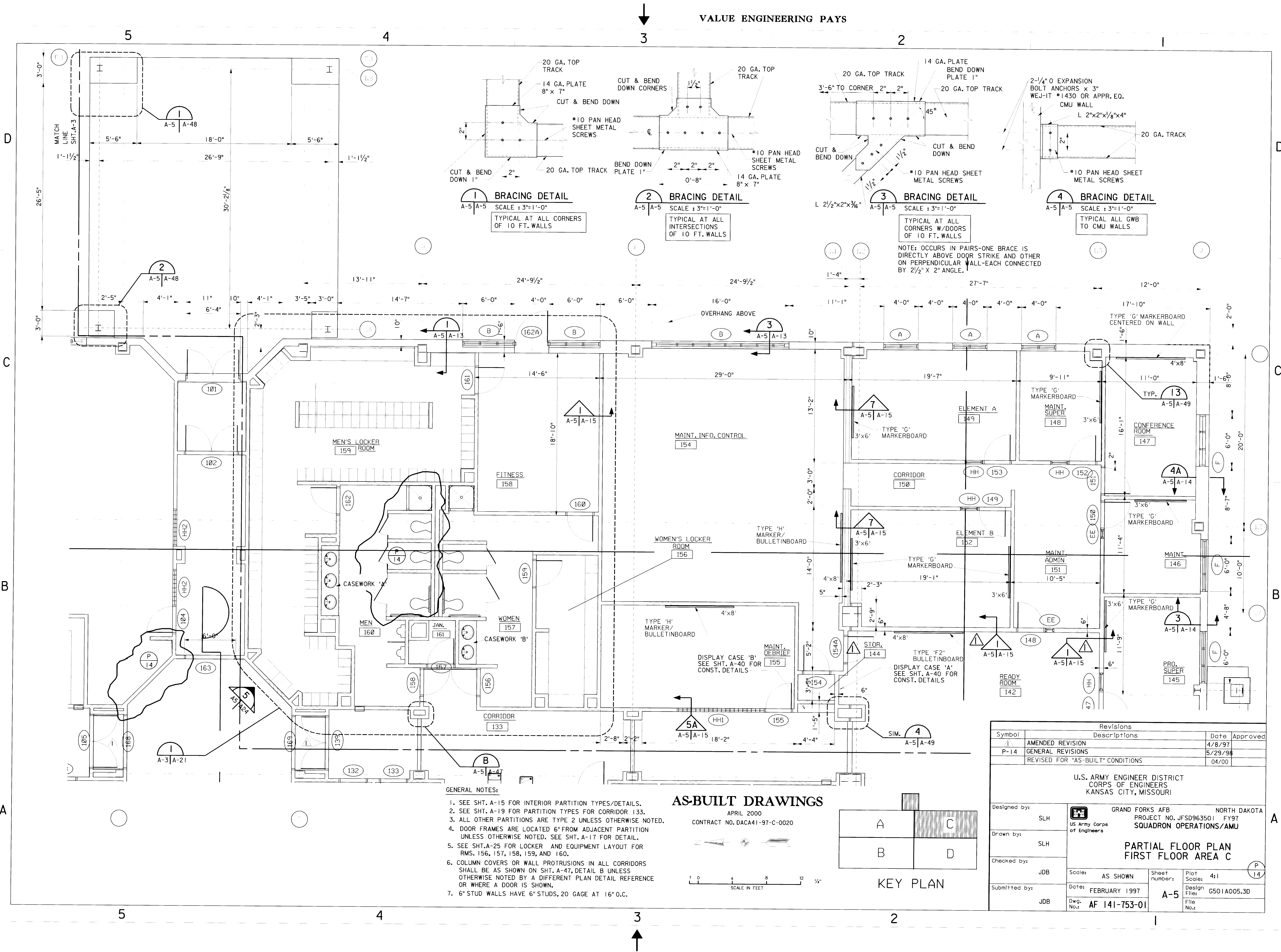
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SCALE IN FEET



KEY PLAN

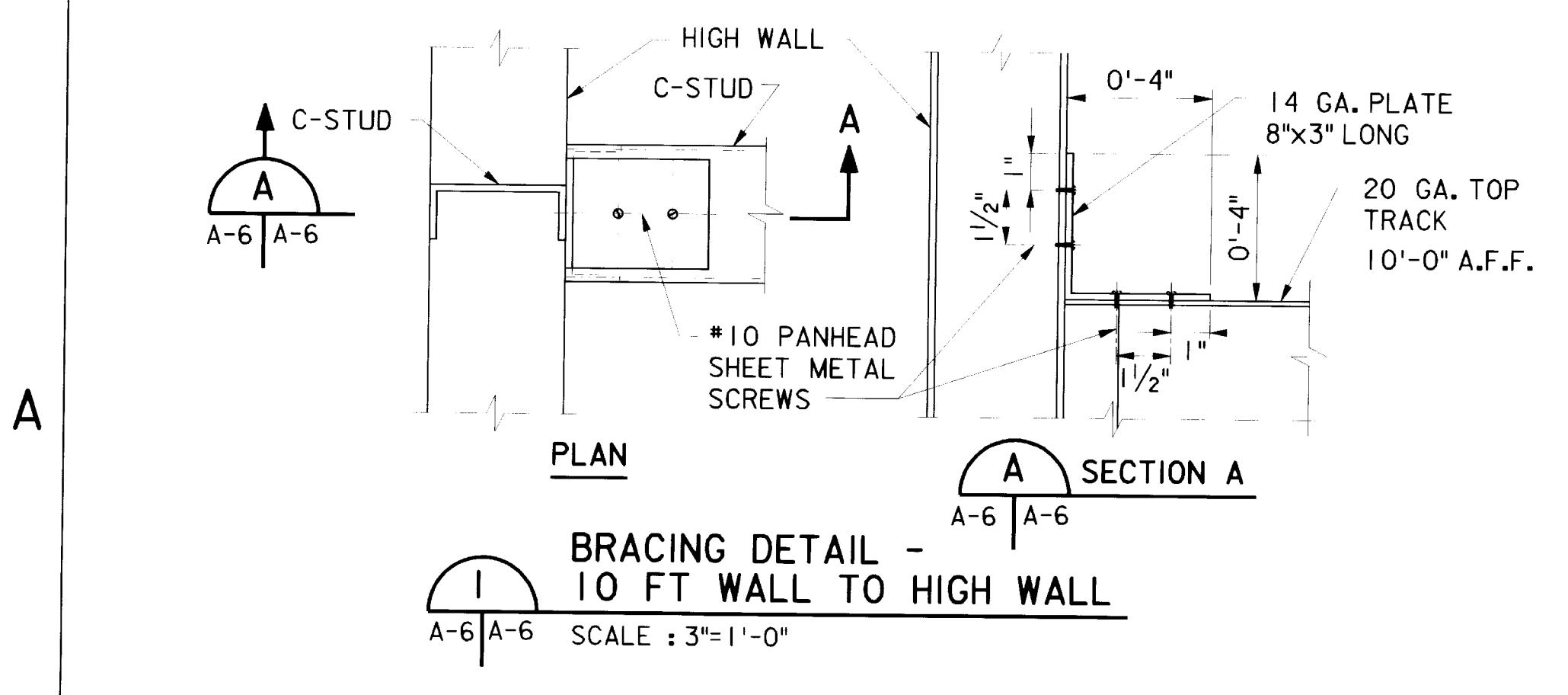
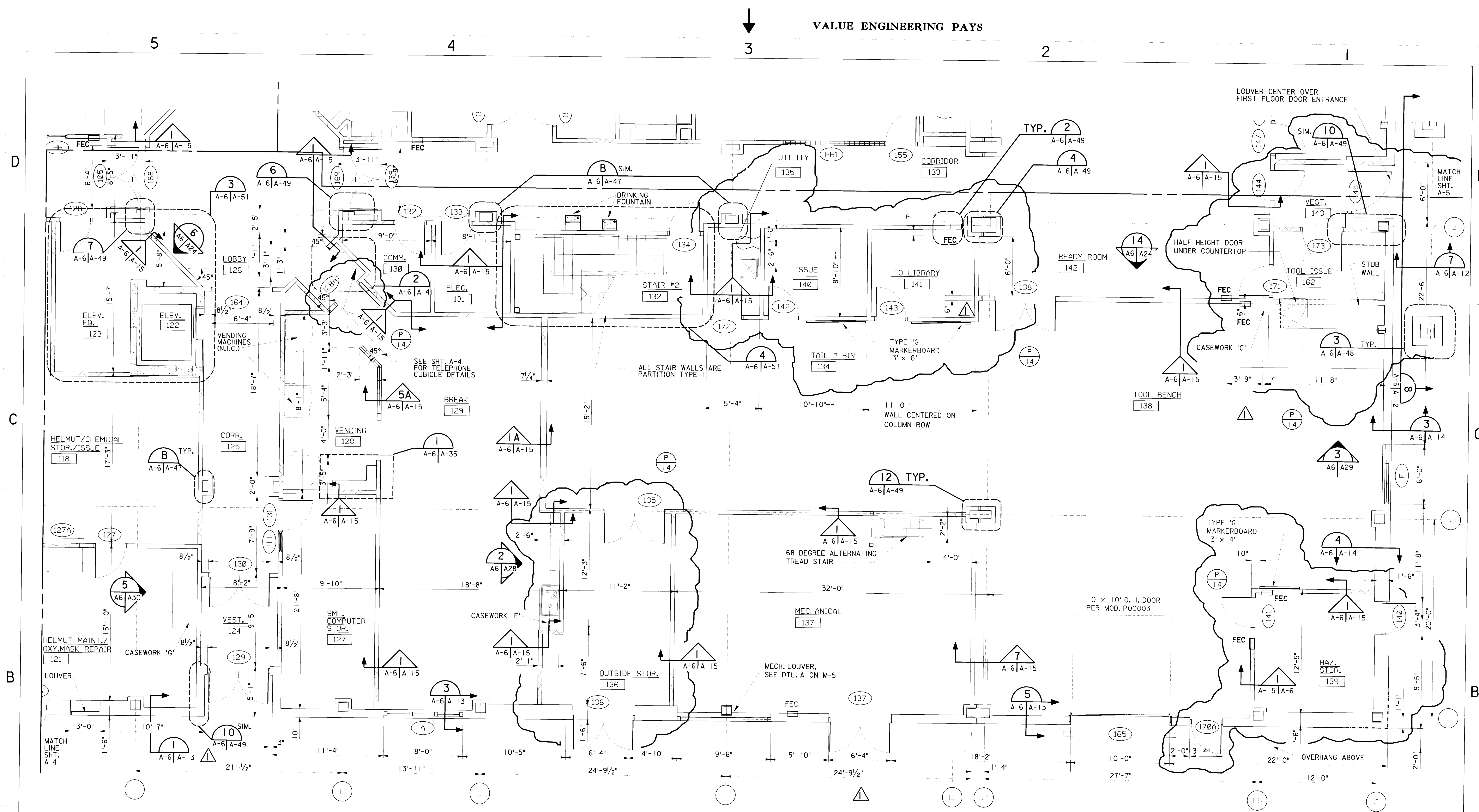
631-00- 156-37 A-4

VALUE ENGINEERING PAYS

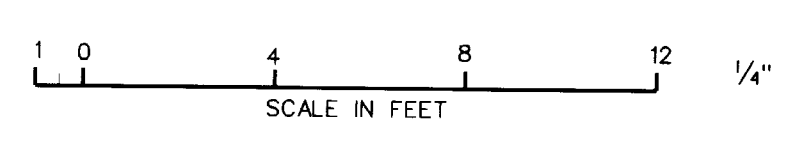


63-000- 156-38 A-5

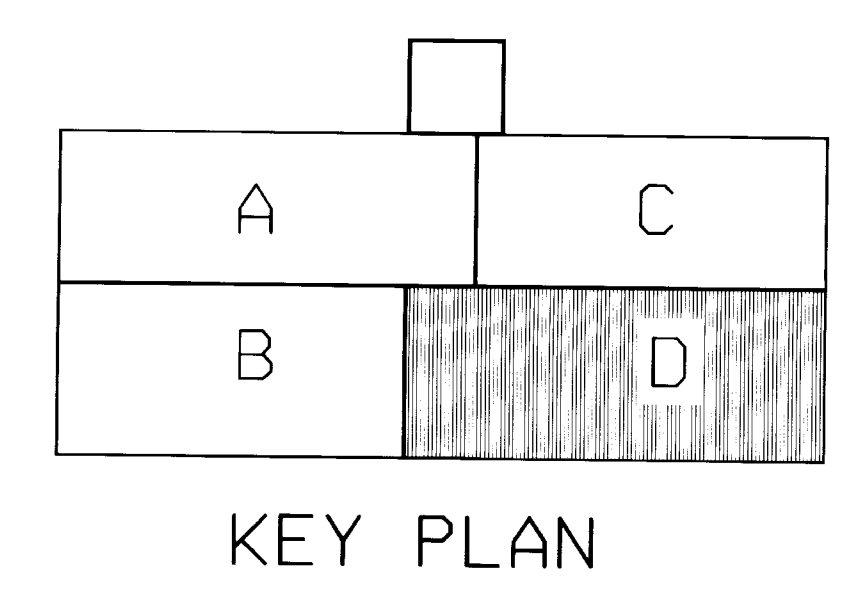
VALUE ENGINEERING PAYS



- GENERAL NOTES:
- PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED. SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
 - SEE SHT. A-19 FOR PARTITION TYPES FOR CORRIDORS 133 AND 125.
 - DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
 - COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.
 - INSTALL SNOW AND ICE GUARDS ON THE TOTAL ROOF, INCLUDING CANOPIES PER MANUFACTURER'S RECOMMENDATIONS.
 - 6" STUD WALLS HAVE 6" STUDS, 20 GAGE AT 16" O.C.



AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

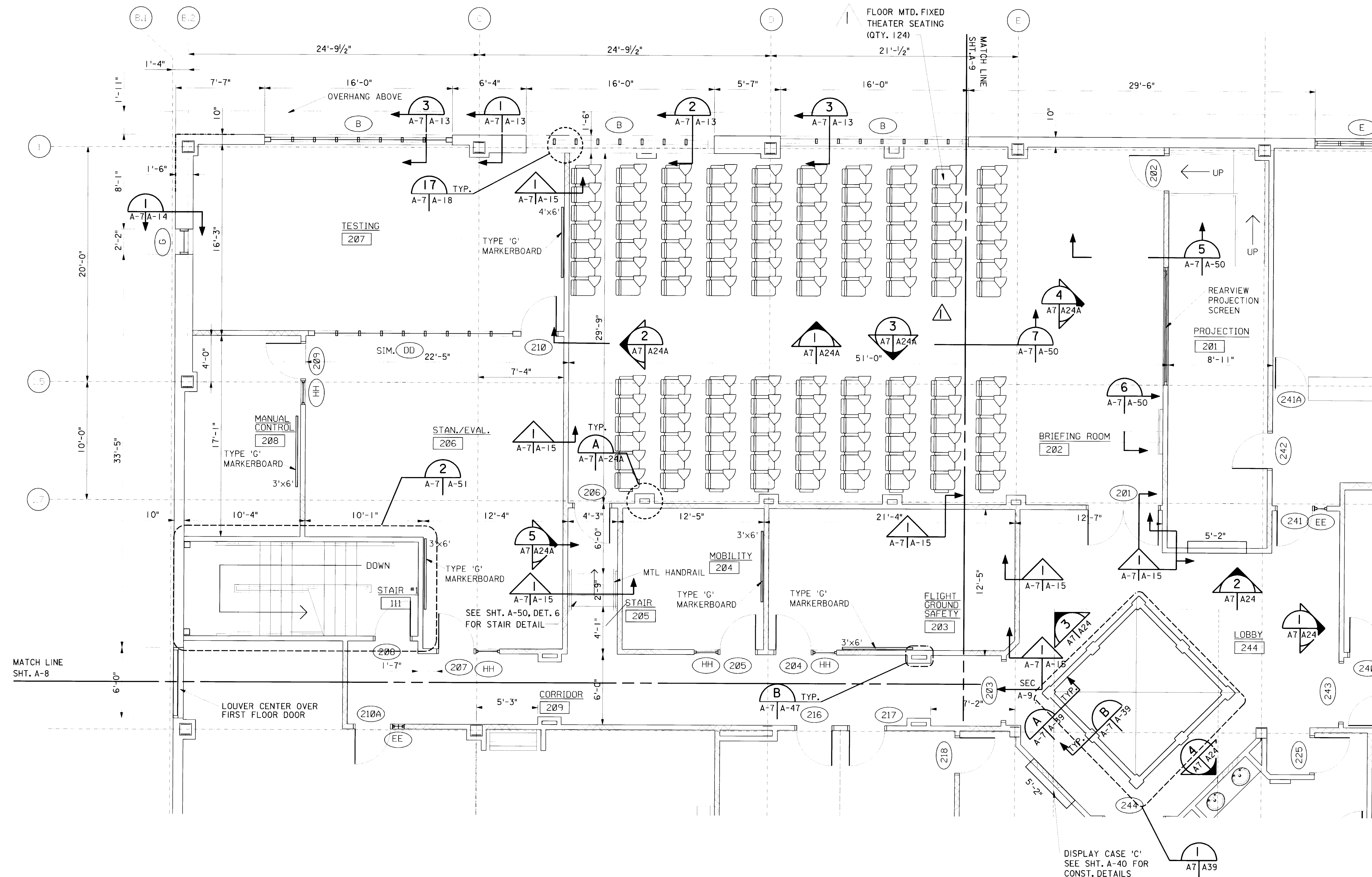


Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB	NORTH DAKOTA
Drawn by:	SLH	US Army Corps of Engineers	PROJECT NO. JFSD963501 FY97
Checked by:	JDB		SQUADRON OPERATIONS/AMU
Submitted by:	JDB		
Dwg. No.:	AF 141-753-01		
Scale:	AS SHOWN	Sheet number:	Plot Scale: 4:1
Date:	FEBRUARY 1997	Design File:	G501A006.3D
		File No.:	

631-00- 156-39 A-6

VALUE ENGINEERING PAYS

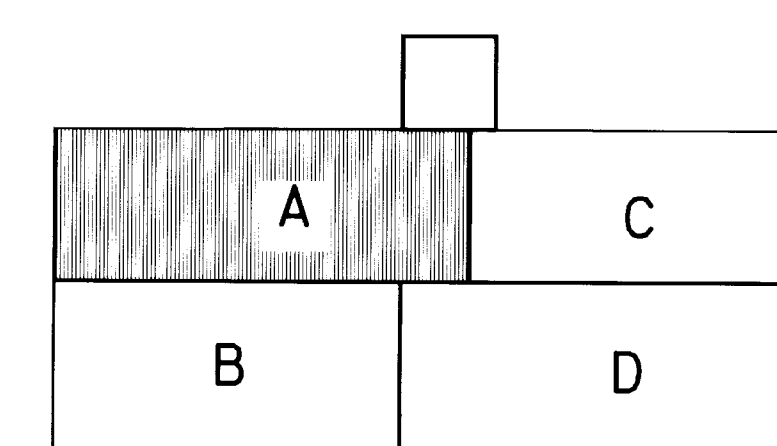


GENERAL NOTES:

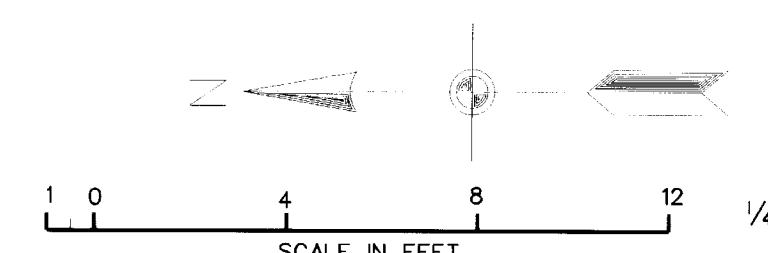
1. SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
2. SEE SHT. A-20 FOR PARTITION TYPES FOR CORRIDOR 209
3. PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED.
4. DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
5. COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



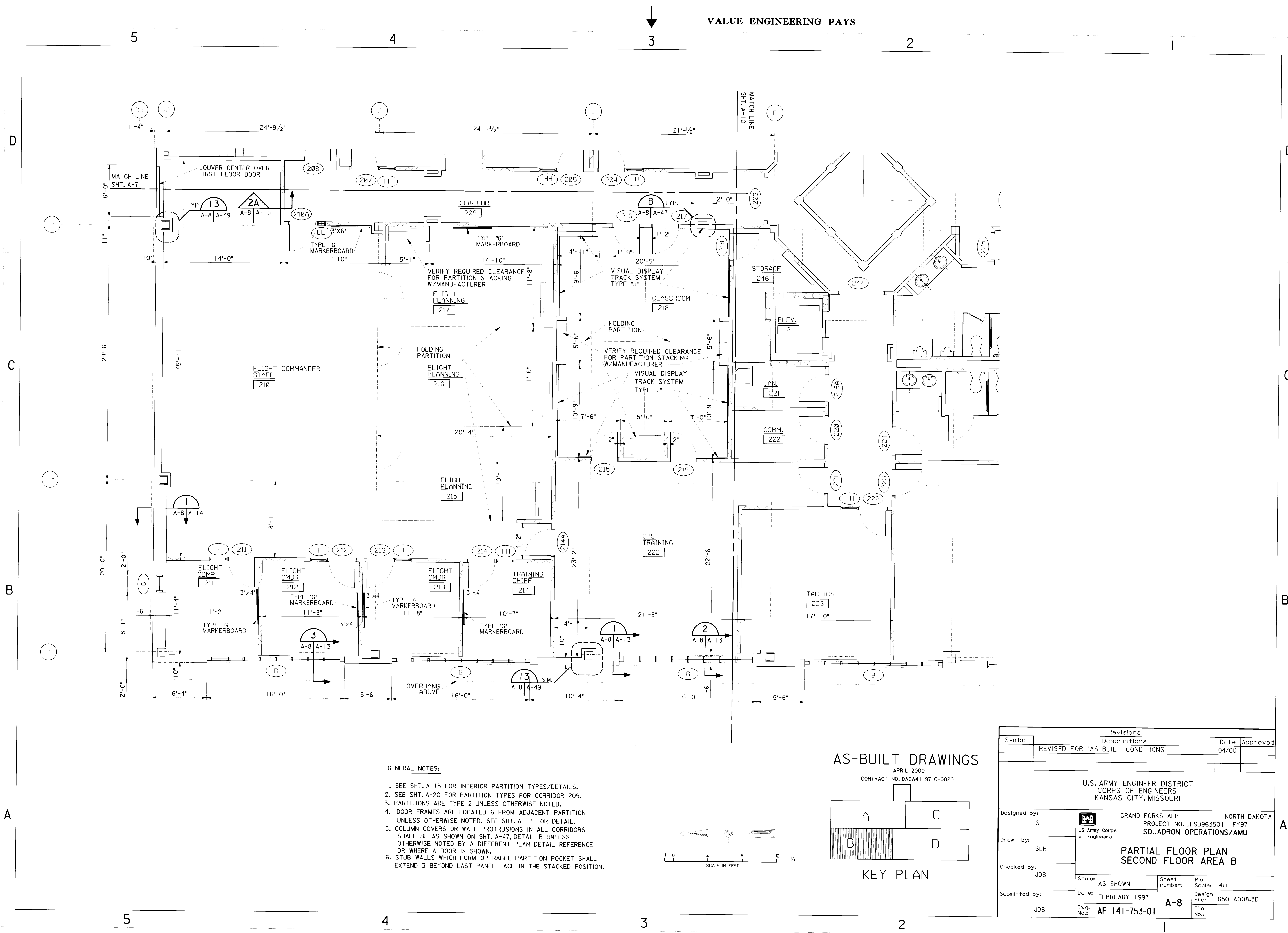
KEY PLAN



Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	SLH	PARTIAL FLOOR PLAN SECOND FLOOR AREA A	
Checked by:	JDB	Scale: AS SHOWN	Sheet number: 4:1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G501A007.3D
		Dwg. No.: AF 141-753-01	File No.:

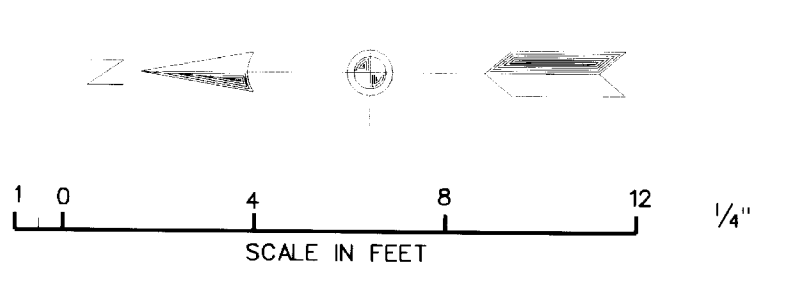
631-000-156-40 A-7

VALUE ENGINEERING PAYS



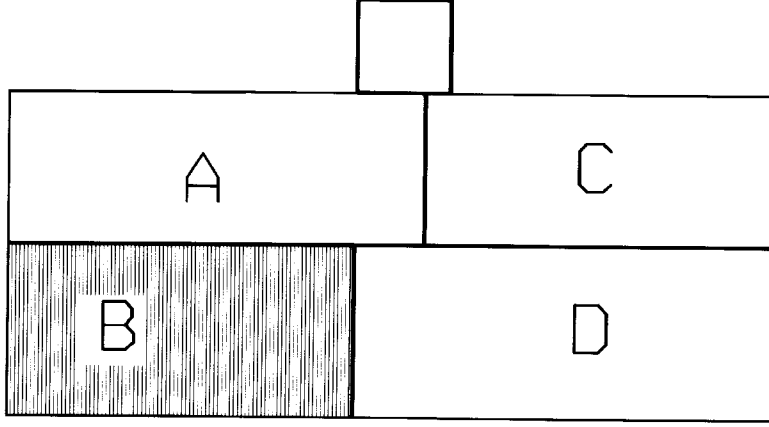
GENERAL NOTES:

1. SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
2. SEE SHT. A-20 FOR PARTITION TYPES FOR CORRIDOR 209.
3. PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED.
4. DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
5. COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.
6. STUB WALLS WHICH FORM OPERABLE PARTITION POCKET SHALL EXTEND 3" BEYOND LAST PANEL FACE IN THE STACKED POSITION.



AS-BUILT DRAWINGS

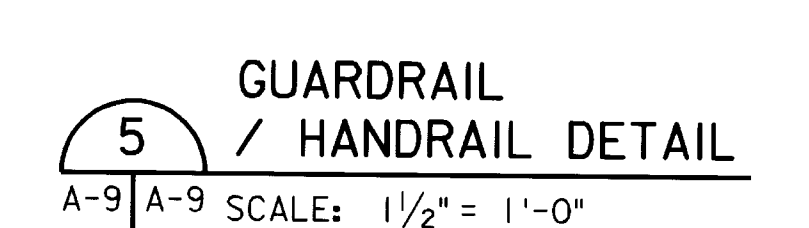
APRIL 2000
CONTRACT NO. DACA41-97-C-0020




KEY PLAN

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	SLH	PARTIAL FLOOR PLAN SECOND FLOOR AREA B	
Checked by:	JDB	Scale: AS SHOWN	Sheet number: 4 of 1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G501A008.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000-156-41 A-8



Symbol	Descriptions	Date	Approved
△	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by: SLH	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by: SLH		<p>PARTIAL FLOOR PLAN SECOND FLOOR AREA C</p>	
Checked by: JDB			
Submitted by: JDB	Scale: AS SHOWN Date: FEBRUARY 1997 Dwg. No. AF 141-753-01	Sheet number: <p style="font-size: 2em; font-weight: bold;">A-9</p>	Plot Scale: 4:1 Design File: G501A009.3D File No.

5 4 3 2 1

D

D

C

C

B

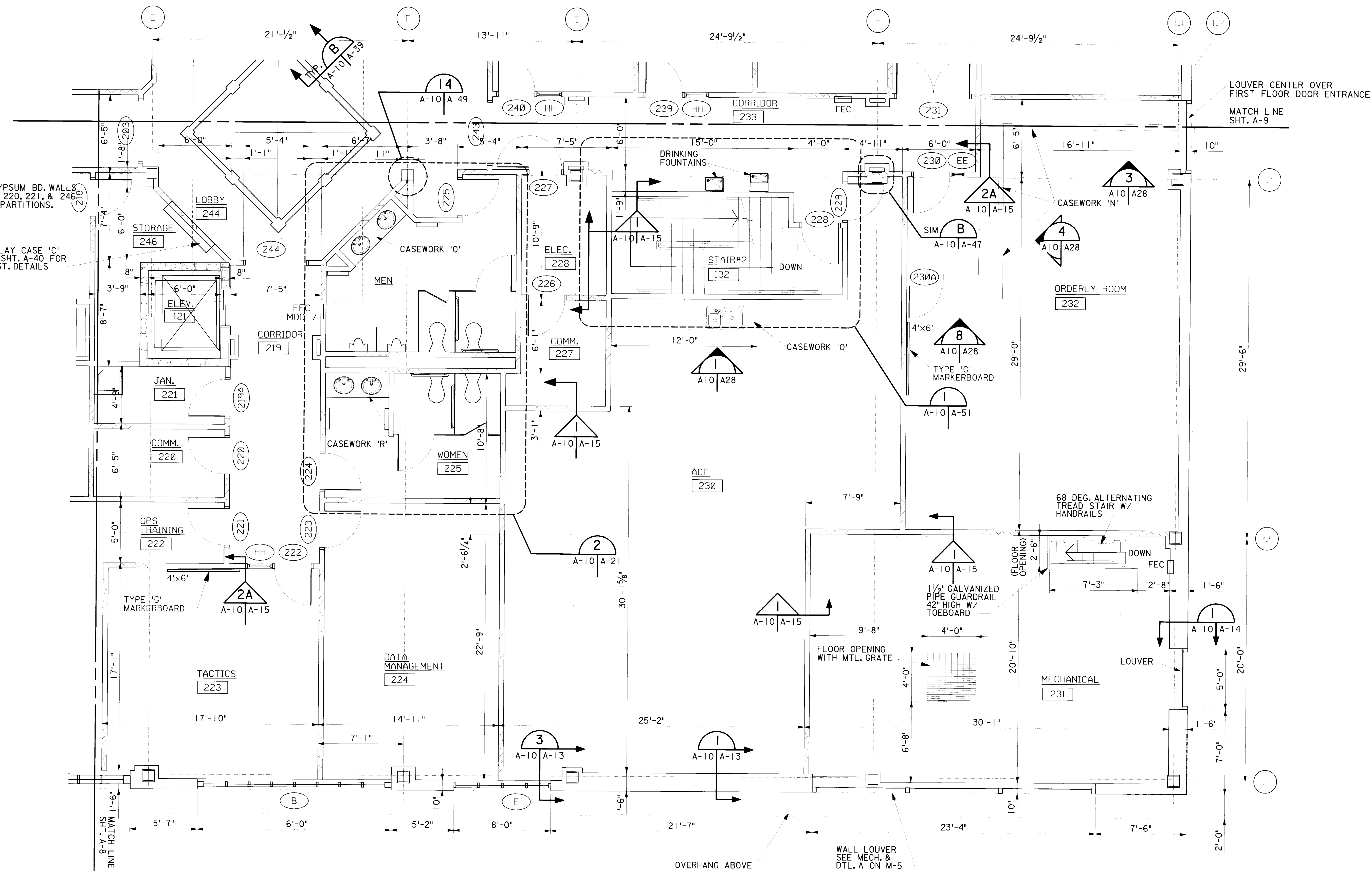
B

A

A

NOTE: ALL GYPSUM BD. WALLS SURROUNDING 220, 221, & 246 ARE TYPE 1 PARTITIONS.

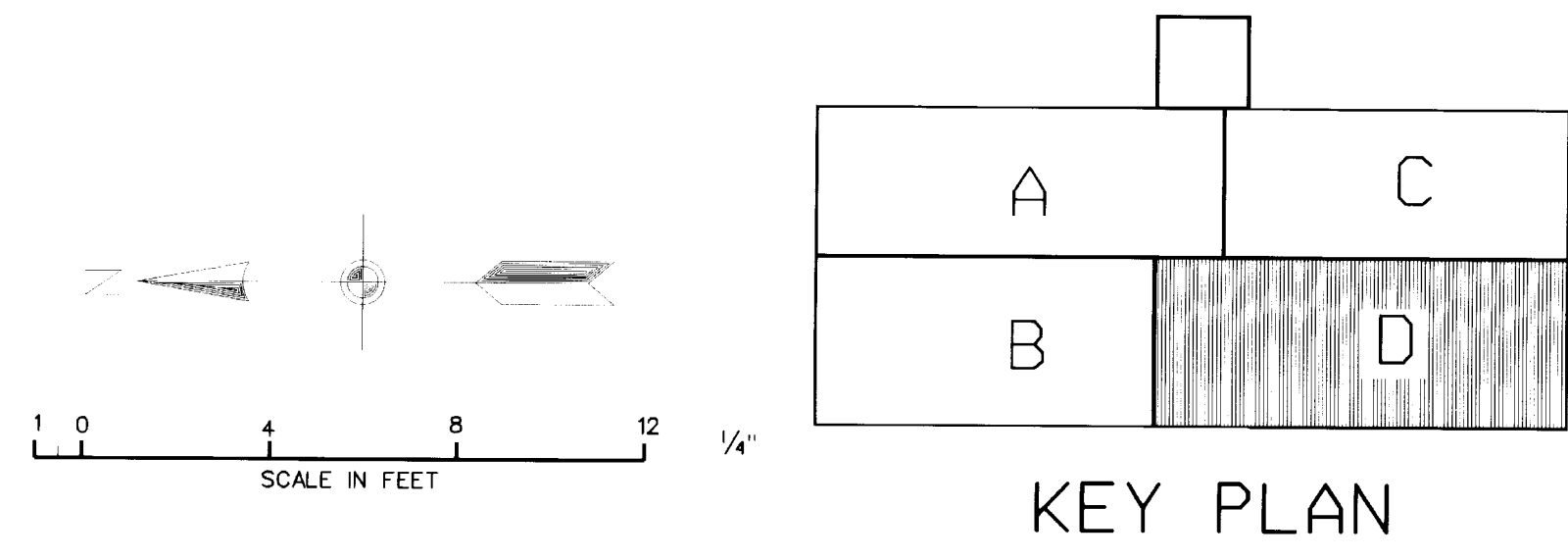
DISPLAY CASE 'C' SEE SHT. A-40 FOR CONST. DETAILS



GENERAL NOTES:

1. SEE SHT. A-15 FOR INTERIOR PARTITION TYPES/DETAILS.
2. SEE SHT. A-20 FOR PARTITION TYPES FOR CORRIDORS 233 AND 219.
3. DOOR FRAMES ARE LOCATED 6" FROM ADJACENT PARTITION UNLESS OTHERWISE NOTED. SEE SHT. A-17 FOR DETAIL.
4. PARTITIONS ARE TYPE 2 UNLESS OTHERWISE NOTED.
5. COLUMN COVERS OR WALL PROTRUSIONS IN ALL CORRIDORS SHALL BE AS SHOWN ON SHT. A-47, DETAIL B UNLESS OTHERWISE NOTED BY A DIFFERENT PLAN DETAIL REFERENCE OR WHERE A DOOR IS SHOWN.

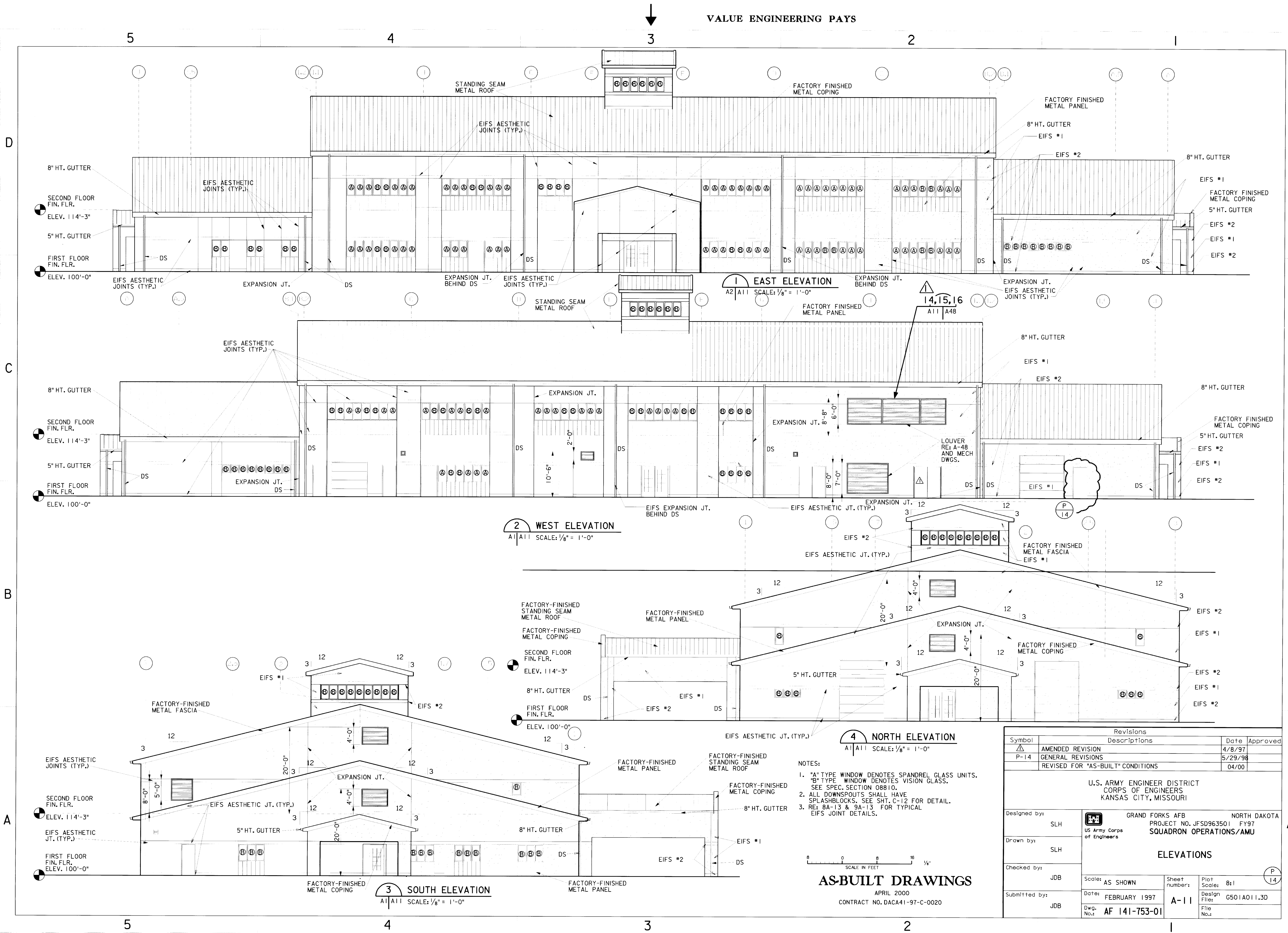
AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU
Drawn by:	SLH	PARTIAL FLOOR PLAN SECOND FLOOR AREA D	
Checked by:	JDB		
Submitted by:	JDB	Scale: AS SHOWN Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Sheet number: A-10 Plot Scale: 4:1 Design File: G501A010.3D File No.:

63-000- 156-43 A-10

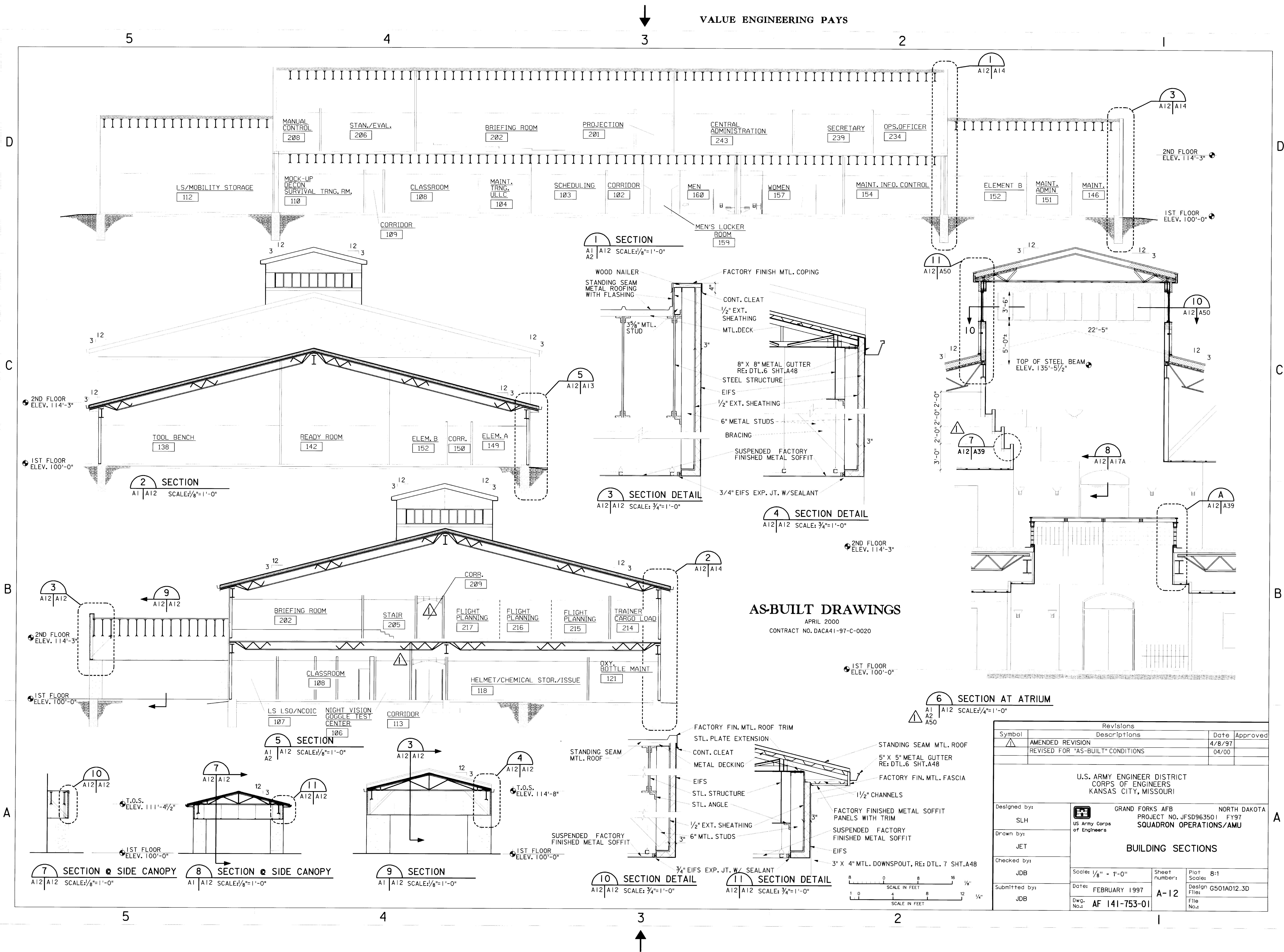
VALUE ENGINEERING PAYS

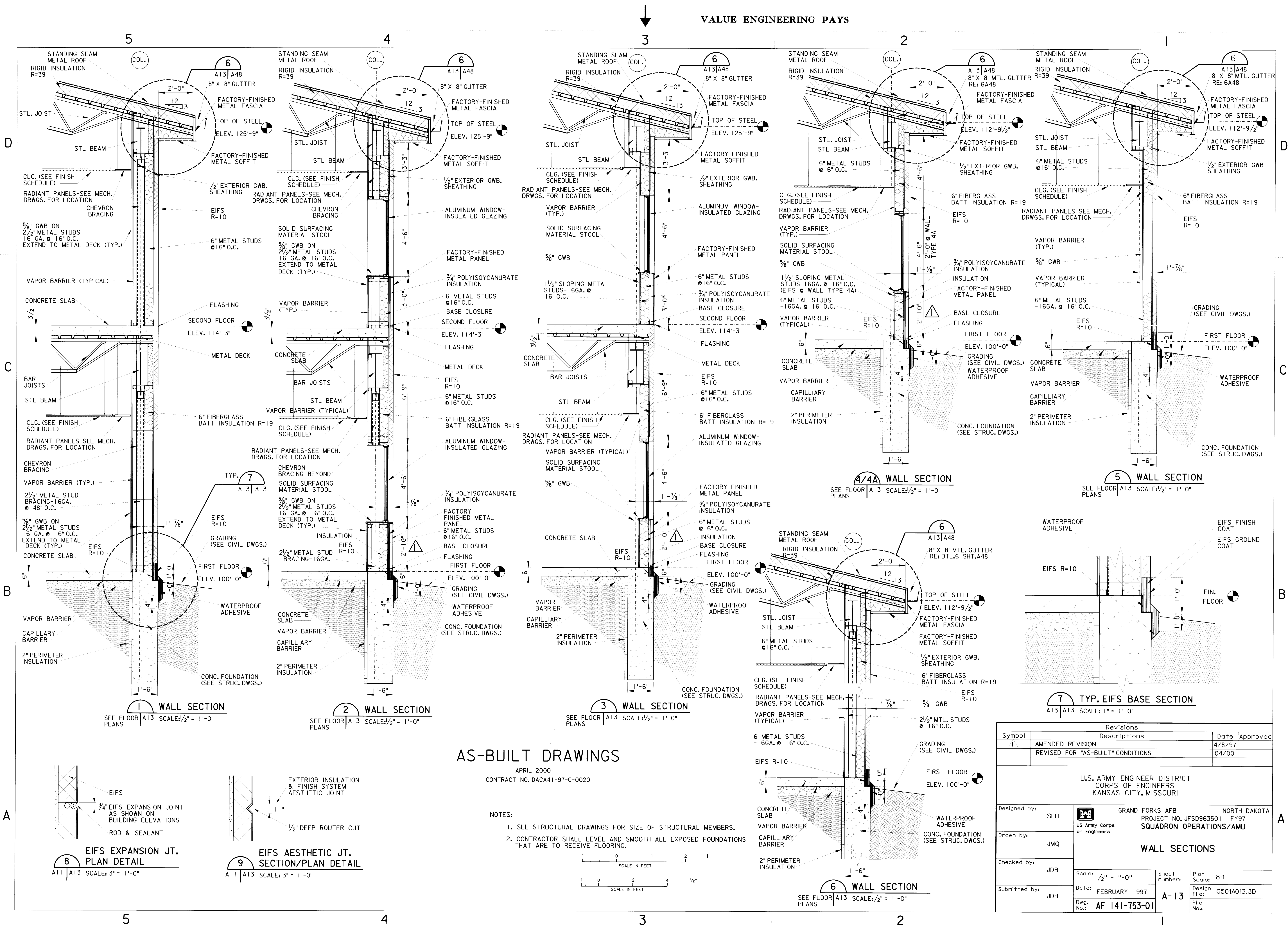


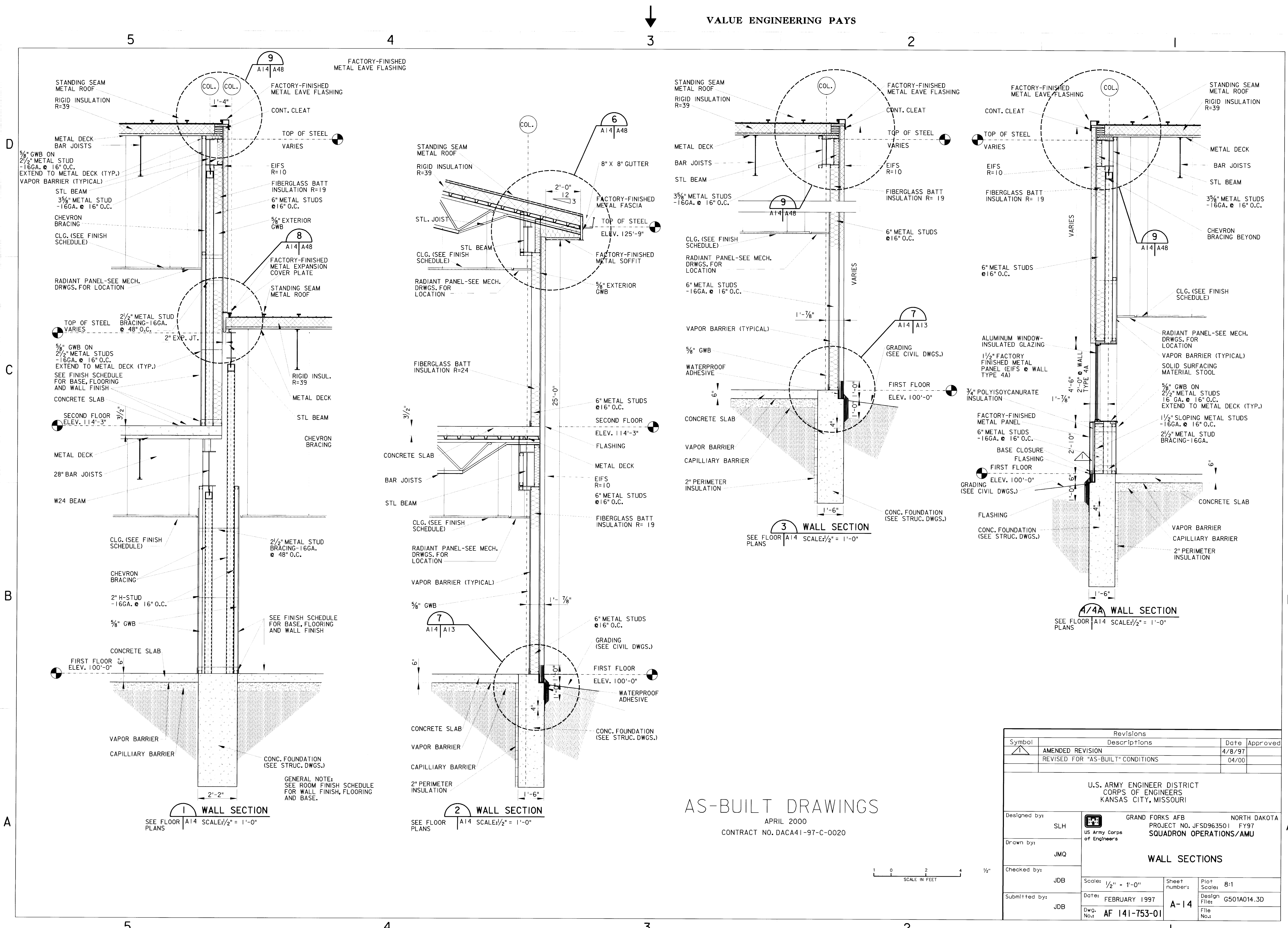
Revisions			
Symbol	Descriptions	Date	Approved
Δ	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	SLH	ELEVATIONS	
Checked by:	JDB	Scale: AS SHOWN	Sheet number: A-11
Submitted by:	JDB	Date: FEBRUARY 1997	Plot Scale: 8:1
		Dwg. No.: AF 141-753-01	Design File: G501A011.3D

63-000- 156-44 A-11







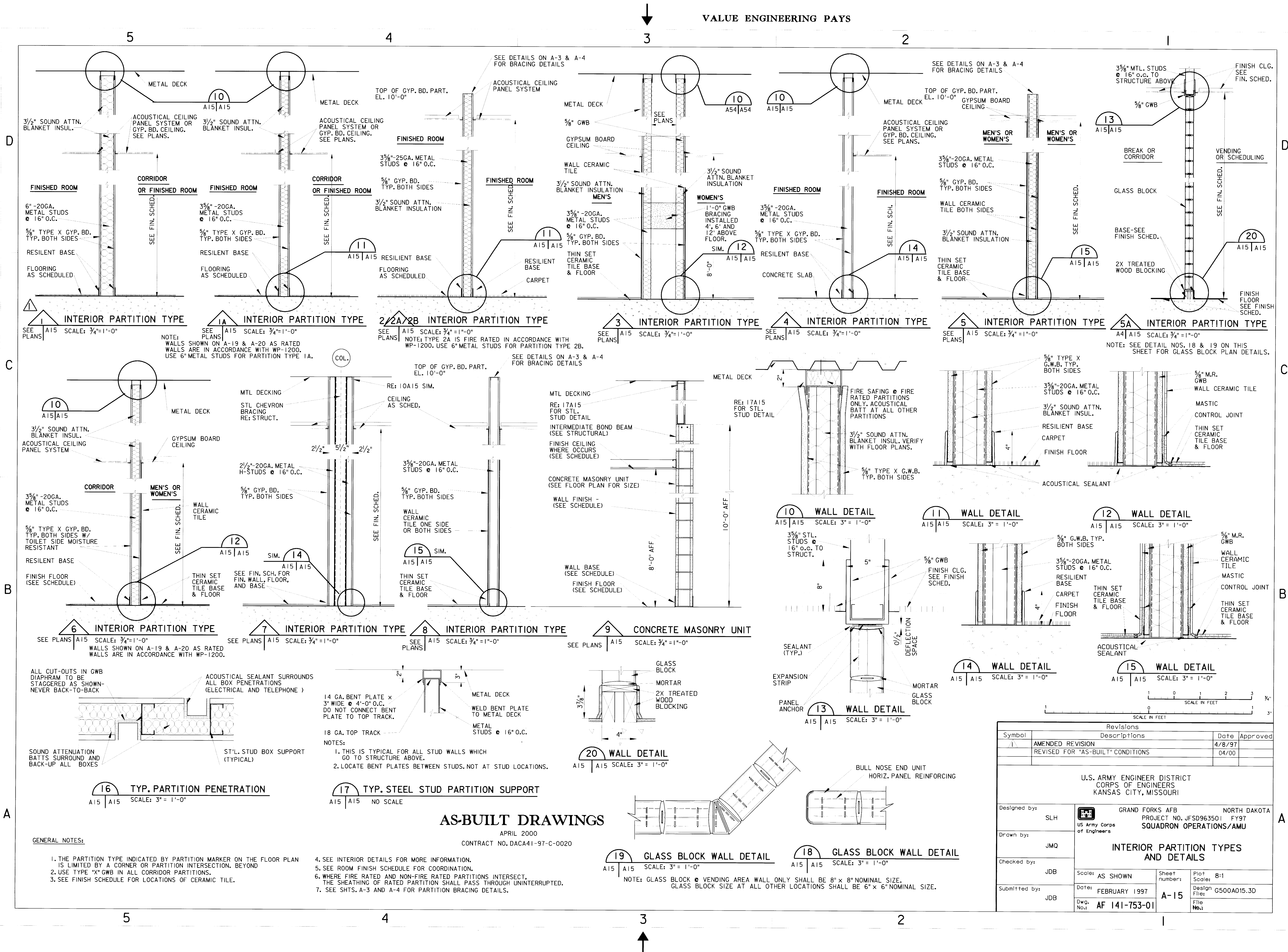
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	SLH	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JMQ	WALL SECTIONS	
Checked by:	JDB	Scale: 1/2" = 1'-0"	Sheet number: 8-1
Submitted by:	JDB	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Design File: GS01A014.3D File No.: A-14

631-000- 156-47 A-14



631-000-156-48 A-15

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JMQ	INTERIOR PARTITION TYPES AND DETAILS	
Checked by:	JDB	Scale: AS SHOWN	Sheet numbers: 8:1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G500A015.3D
		Dwg. No.: AF 141-753-01	File No.:

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A

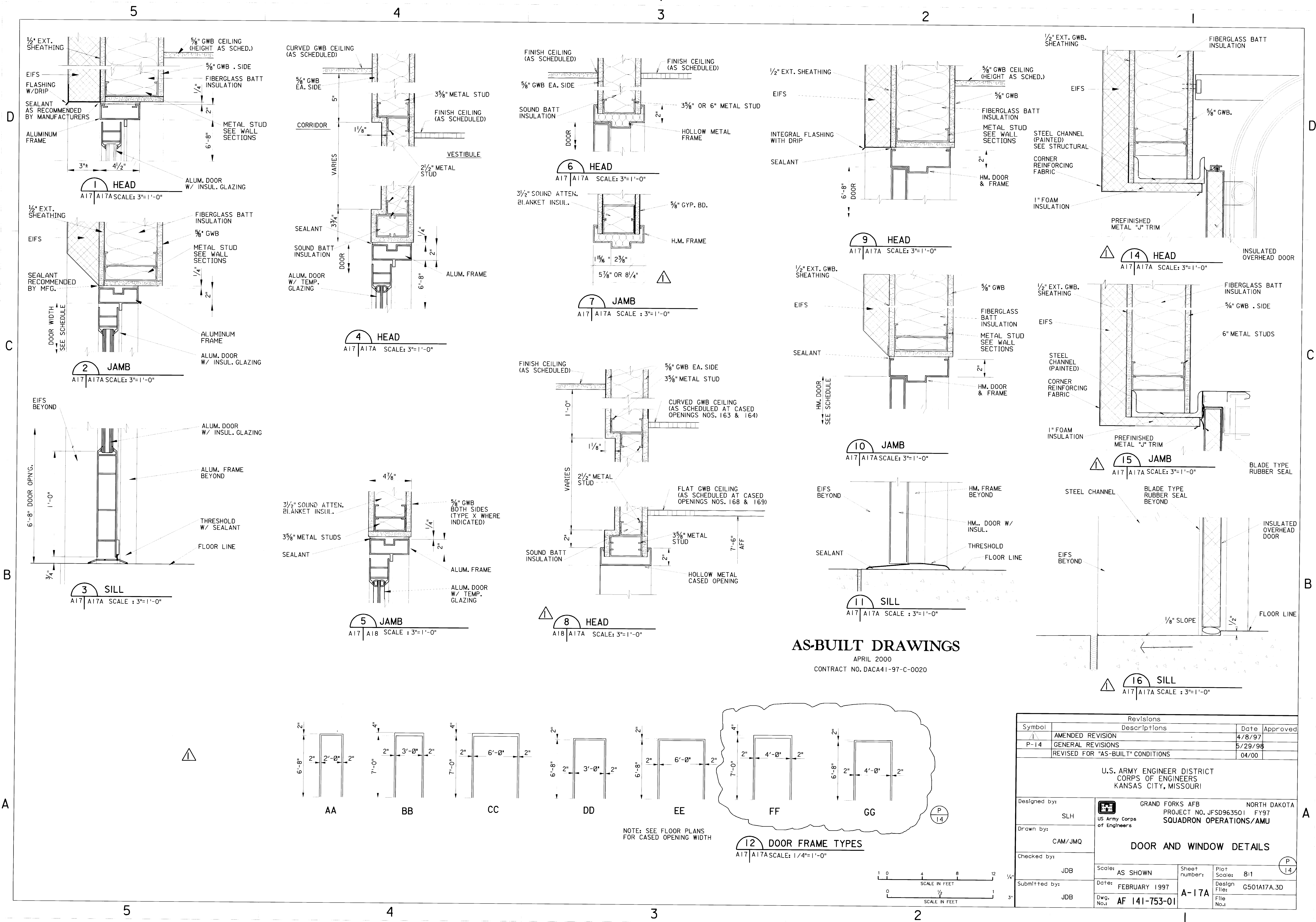
DOOR SCHEDULE

DOOR NO.	DOOR TYPE	DOOR MAT.	FRAME TYPE	FRAME MAT.	DOOR SIZE W	DOOR SIZE H	DOOR SIZE T	LABEL	LOUVER	HDWR SET	REMARKS	DETAILS HEADJAMB SILL
101	AFG	ALUM	CC	ALUM	PR. 3'-0"	7'-0"	1 3/4"	—	—	1		1 2 3
102	AFG	ALUM	EE	ALUM	PR. 3'-0"	6'-8"	1 3/4"	—	—	3		4 5 —
103	NOT USED											
104	F	WD	DD	HM	—	3'-0"	6'-8"	1 3/4"	—	8		6 7 —
105	WFG	WD	EE		PR. 3'-0"	6'-8"		—	—	10	SOLID WOOD STILE DOOR	8 — —
106	F	WD	DD		—	3'-0"	6'-8"		—	8		6 — —
107		WD			—	3'-0"	6'-8"		—	8		— — —
108		WD			—	3'-0"	6'-8"		—	8		— — —
109		WD			—	3'-0"	6'-8"		—	8		— — —
110		WD			—	3'-0"	6'-8"		—			— — —
111		WD			—	3'-0"	6'-8"		—			— — —
112		WD			—	3'-0"	6'-8"		—			— — —
113	✓	WD	✓		—	3'-0"	6'-8"		—	✓	(MOD. P00012)	— — —
114	NF	HM	EE	✓	PR. 3'-0"	6'-8"		B	—	16	NOTE "1"	— — —
115	F	HM	EE	HM	PR. 3'-0"	6'-8"		B	—	9	NOTE "1" ASTRAGALS REQ. (MOD. P00022)	✓ — —
116	AFG	ALUM	EE	ALUM	PR. 3'-0"	6'-8"		—	—	3		4 5 —
117	AFG	ALUM	CC	ALUM	PR. 3'-0"	7'-0"		—	—	1		1 2 3
118	F	HM	EE	STL	PR. 3'-0"	6'-8"		B	—	9	NOTE "1"	6 7 —
119	F	HM	EE	HM	PR. 3'-0"	6'-8"		—	—	9	NOTE "1"	— — —
120	F	HM	BB		—	3'-0"	7'-0"		—	2		9 10 11
121		HM	BB		—	3'-0"	7'-0"		—	2		9 10 11
122		HM	EE	✓	PR. 3'-0"	6'-8"		—	—	11	NOTE "1" ASTRAGALS REQ. (MOD. P00022)	6 7 —
123	✓	HM	EE	✓	PR. 3'-0"	6'-8"		—	—	9	NOTE "1" ASTRAGALS REQ. (MOD. P00022)	6 7 —
124	F	HM	BB	HM	—	3'-0"	7'-0"	1 3/4"	—	8	NOTE "1"	17 18 —
124A	RCD	SS	—	ALUM	—	3'-10"	3'-8"		—	—		DET C/A32
125	F	HM	BB	HM	—	3'-8"	7'-0"	1 3/4"	—	2		9 10 11
126	F	HM	BB	HM	—	3'-0"	7'-0"	1 3/4"	—	2		9 10 11
127	F	HM	DD	HM	—	3'-0"	6'-8"	1 3/4"	—	7	NOTE "1"	6 7 —
127A	RCD	SS	—	ALUM	—	3'-9"	3'-6"		—	—		DET A/A32
128	F	HM	DD	HM	—	3'-8"	6'-8"	1 3/4"	—	7	NOTE "1"	6 7 —
128A	F	WD	DD	HM	—	3'-0"	6'-8"	1 3/4"	—	8		6 7 —
129	AFG	ALUM	CC	ALUM	PR. 3'-0"	7'-0"		—	—	1		1 2 3
130	AFG	ALUM	EE	ALUM	PR. 3'-0"	6'-8"		—	—	3		4 5 —
131	F	WD	DD	HM	—	3'-0"	6'-8"		—	7		6 7 —
132	F	WD	DD		—	3'-0"	6'-8"		—	7		— — —
133	F	WD	DD		—	3'-0"	6'-8"		B	7		— — —
134	NF	WD	DD		—	3'-0"	6'-8"		B	6		— — —
135	F	WD	DD		PR. 3'-0"	6'-8"		—	—	9		✓ — —
136	F	HM	CC	✓	PR. 3'-0"	7'-0"		—	—	5	ASTRAGAL REQ. (MOD. P00022)	9 10 11
137	F	HM	CC	✓	PR. 3'-0"	7'-0"		—	—	5		9 10 11
138	F	HM	EE	HM	PR. 3'-0"	6'-8"	1 3/4"	—	—	9	NOTE "1"	6 7 —
138A	—	—	—	—	—	—	—	—	—	—	NOT USED	— — —
138B	F	HM	FP1	HM	—	3'-0"	3'-4"	1 3/4"	—	13	NOTE "1"	6 — —
139	WFG	WD	EE	HM	PR. 3'-0"	6'-8"	1 3/4"	C	—	10		8 7 —
140	F	HM	BB		—	3'-0"	7'-0"		—	2		9 10 11
141	F	HM	DD		—	3'-0"	6'-8"		B	17		6 7 —
142	F	WD	DD		—	3'-0"	6'-8"		—	8		6 7 —
143	F	WD	DD		—	3'-0"	6'-8"		—	8		6 7 —
144	N	HM	DD	✓	—	3'-8"	6'-8"		—	14		6 7 —
145	N	HM	FF	✓	—	4'-0"	7'-0"	1 3/4"	—	18		9 10 11
146	—	—	—	—	—	—	—	—	—	—	NOT USED	— — —
147	F	WD	DD	HM	—	3'-0"	6'-8"	1 3/4"	—	8		6 7 —
148	F	WD			—	3'-0"	6'-8"		—			— — —
149	F	WD			—	3'-0"	6'-8"		—			— — —
150	F	WD			—	3'-0"	6'-8"		—			— — —
151	F	WD			—	3'-0"	6'-8"		—			— — —
152	F	WD			—	3'-0"	6'-8"		—			— — —
153	F	WD			—	3'-0"	6'-8"		—	✓		— — —
154	F	WD			—	3'-0"	6'-8"		—	7		— — —
154A	F	WD			—	3'-0"	6'-8"		—	17		— — —
155	F	WD			—	3'-0"	6'-8"		—	8		— — —
156	F	WD			—	3'-0"	6'-8"		—	4		— — —
157	F	WD	✓	✓	—	3'-0"	6'-8"		—	7		— — —
158	F	WD	DD	HM	—	3'-0"	6'-8"	1 3/4"	—	4		— — —



DOOR SCHEDULE

DOOR SCHEDULE																
DOOR NO.	DOOR			FRAME		DOOR SIZE			LABEL	LOUVER	HDWR SET	REMARKS	DETAILS			
	STYLE	TYPE	MAT.	TYPE	MAT.	W	H	T					HEAD	JAMB	SILL	
159		F	WD			—	3'-0"	6'-8"	1¾"	—	—	4		6	7	—
160		F	WD			—	3'-0"	6'-8"		—	—	4				—
161		F	WD			—	3'-0"	6'-8"		—	—	4	MOD. P00012			—
162		F	WD	DD	HM	—	3'-0"	6'-8"	1¾"	—	—	4				—
162A		F	HM	BB	HM		3'-8"	7'-0"	1¾"	—	—	12	PANIC DEVICE TO SET OFF LOCAL ALARM (MOD. P00022)	9	10	11
163		CO	—	EE	HM		6'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2	6	7	-
164		CO	—	EE	HM		6'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2	6	7	-
165		OH	STL	—	STL		10'-0"	10'-0"	—	—	—	—	OVERHEAD DOOR	14	15	16
166		OH	STL	—	STL		8'-0"	8'-0"	—	—	—	—	OVERHEAD DOOR	14	15	16
167		OH	STL	—	STL		10'-0"	14'-0"	—	—	—	—	OVERHEAD DOOR	14	15	16
168		CO	—	EE	HM		6'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2	6	7	-
169		CO	—	EE	HM		6'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2	6	7	-
170		OH	STL	—	STL		10'-0"	14'-0"	—	—	—	—	OVERHEAD DOOR	14	15	16
170A		F	HM	BB	HM		3'-0"	7'-0"	1¾"	—	—	2		9	10	11
171		NF	HM	DD	HM		3'-0"	6'-8"	1¾"	—	—	8		6	7	-
172		F	HM	DD	HM		3'-0"	6'-8"	1¾"	—	—	15		6	7	-
173		NF	HM	GG	HM		4'-0"	6'-8"	1¾"	—	—	19		6	7	-
201		NF	WD	EE	HM	PR.	3'-0"	6'-8"	1¾"	B	—	16		6	7	
202		F	WD	DD			3'-0"	6'-8"		—	—	7		6	7	
203		CO		EE			5'-0"	6'-8"		—	—	—	USE FRAME PROFILE 2			
204		F	WD	DD			3'-0"	6'-8"		C	—	8		6	7	
205		F	WD				3'-0"	6'-8"		C	—	8				
206		F	WD				3'-0"	6'-8"		C	—	8				
207		F	WD				3'-0"	6'-8"		C	—	8				
208		NF	WD				3'-0"	6'-8"		B	—	6				
209		F	WD				3'-0"	6'-8"		—	—	8				
210		F	WD				3'-0"	6'-8"		—	—	8				
210A		F	WD				3'-0"	6'-8"		C	—	8				
211		F	WD				3'-0"	6'-8"		—	—	8				
212		F	WD				3'-0"	6'-8"		—	—	8				
213		F	WD				3'-0"	6'-8"		—	—	8				
214		N	WD				3'-0"	6'-8"		—	—	8				
214A		N	WD				3'-0"	6'-8"		—	—	8				
215		N	WD				3'-0	6'-8"		—	—	8				
216		NF	WD				3'-0	6'-8"		C	—	8				
217		NF	WD				3'-0	6'-8"		C	—	8				
218		F	WD				3'-0"	6'-8"		—	—	7				
219		N	WD		✓		3'-0"	6'-8"		—	—	8				
219A		F	WD		HM		3'-0"	6'-8"		C	—	7				
220		F	WD				3'-0"	6'-8"		C	—	7				
221		F	WD				3'-0"	6'-8"		C	—	8				
222		F	WD				3'-0"	6'-8"		C	—	8				
223		F	WD				3'-0"	6'-8"		C	—	8				
224		F	WD				3'-0"	6'-8"		C	—	4				
225		F	WD				3'-0"	6'-8"		C	—	4				
226		F	WD				3'-0"	6'-8"		C	—	7				
227		F	WD				3'-0"	6'-8"		C	—	7				
228		NF	WD				3'-0"	6'-8"		B	—	6				
229		F	WD				3'-0"	6'-8"		C	—	8				
230			WD	✓			3'-0"	6'-8"		C	—	8				
230A			WD	FP1	✓		2'-8"	3'-0"	✓	—	—	13				
231			WD	EE	HM	PR.	3'-0"	6'-8"	1¾"	C	—	11	ASTRAGAL & COORD. REQ.			
232			WD	DD			3'-0"	6'-8"		—	—	8				
233			WD				3'-0"	6'-8"		—	—	8				
234			WD				3'-0"	6'-8"		—	—	8				
235			WD				3'-0"	6'-8"		—	—	8				
236			WD				3'-0"	6'-8"		—	—	8				
237			WD				3'-0"	6'-8"		—	—	8				
238			WD				3'-0"	6'-8"		—	—	8				
239			WD				3'-0"	6'-8"		C	—	8				
240			WD		✓		3'-0"	6'-8"		C	—	8				
241			WD	✓	HM		3'-0"	6'-8"		C	—	8				
241A			WD	FP1	HM		2'-8"	3'-0"	✓	—	—	13				
242		✓	WD	DD	HM		3'-0"	6'-8"		B	—	7				
243		CO	—	EE	HM		5'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2			
244		CO	—	EE	HM		5'-0"	6'-8"	—	—	—	—	USE FRAME PROFILE 2	✓	✓	

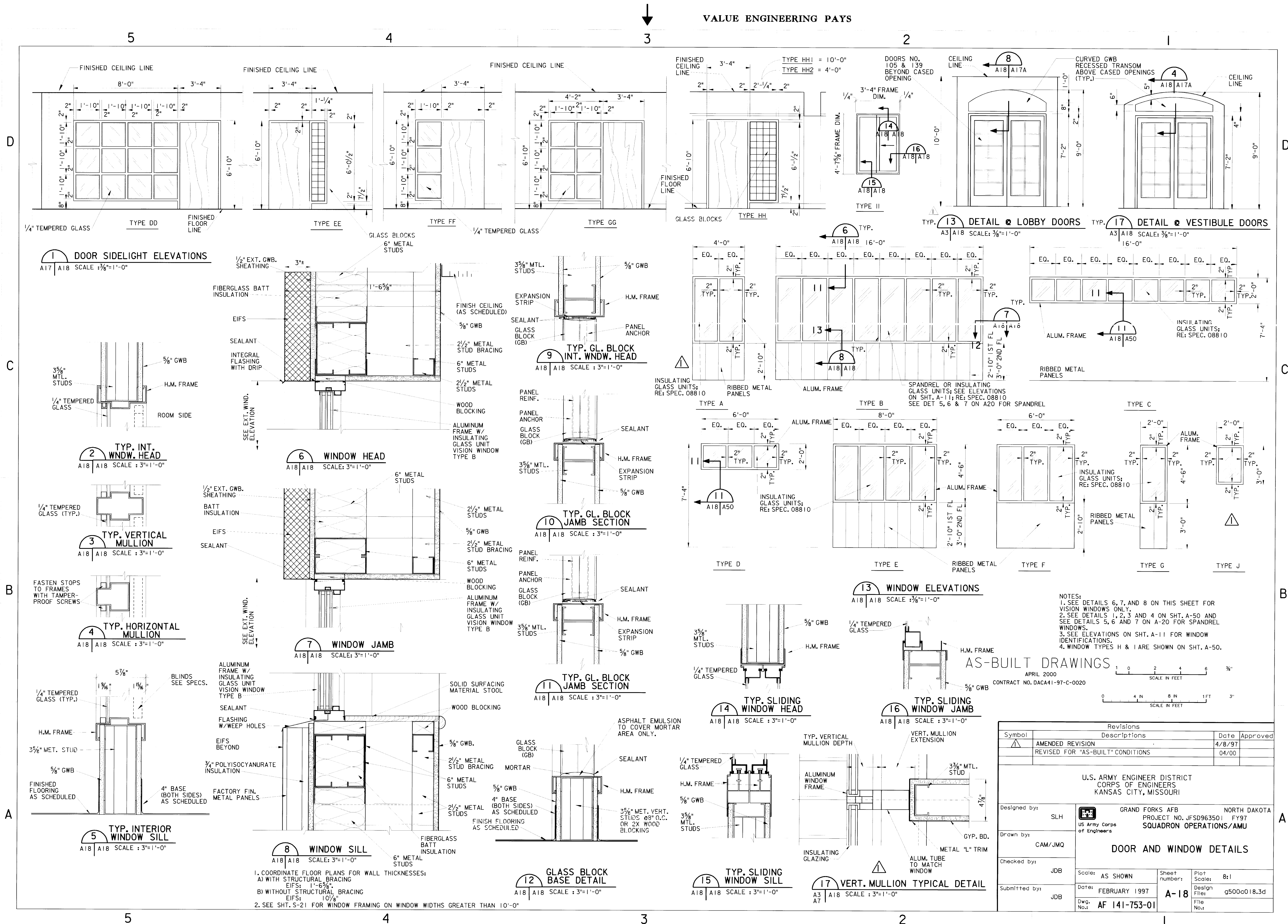


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB NORTH DAKOTA	
Drawn by:	CAM/JMQ	PROJECT NO. JFSD963501 FY97	
Checked by:	JDB	SQUADRON OPERATIONS/AMU	
Submitted by:	JDB		
Scale:	AS SHOWN	Sheet number:	Plot Scale: 8:1
Date:	FEBRUARY 1997	Design File:	G501A17A.3D
Dwg. No.:	AF 141-753-01	File No.:	

631-000-156-51 A-17A



631-000-156-52 A-18

VALUE ENGINEERING PAYS

REFLECTED CEILING LEGEND

- 1' X 4' FLUORESCENT LIGHT FIXTURE
- 2' X 4' FLUORESCENT LIGHT FIXTURE
- 2' X 2' FLUORESCENT LIGHT FIXTURE
- HID RECESSED FIXTURE
- RECESSED DOWNLIGHT
- PENDENT MTD INDIRECT FLUORESCENT FIXTURE
- EXIT LIGHT

- RETURN AIR VENT
- SUPPLY AIR DIFFUSER
- STRIP DIFFUSER
- P.A. SPEAKER

FIRE PROTECTION LEGEND

- 1 HOUR RATED PARTITION
- 20 MINUTE RATED PARTITION
- FIRE WALLS GO TO STRUCTURE DECK ABOVE
- EXIT LIGHT
- EMERGENCY LIGHT FIXTURE
- WALLS TO STRUCTURE ABOVE

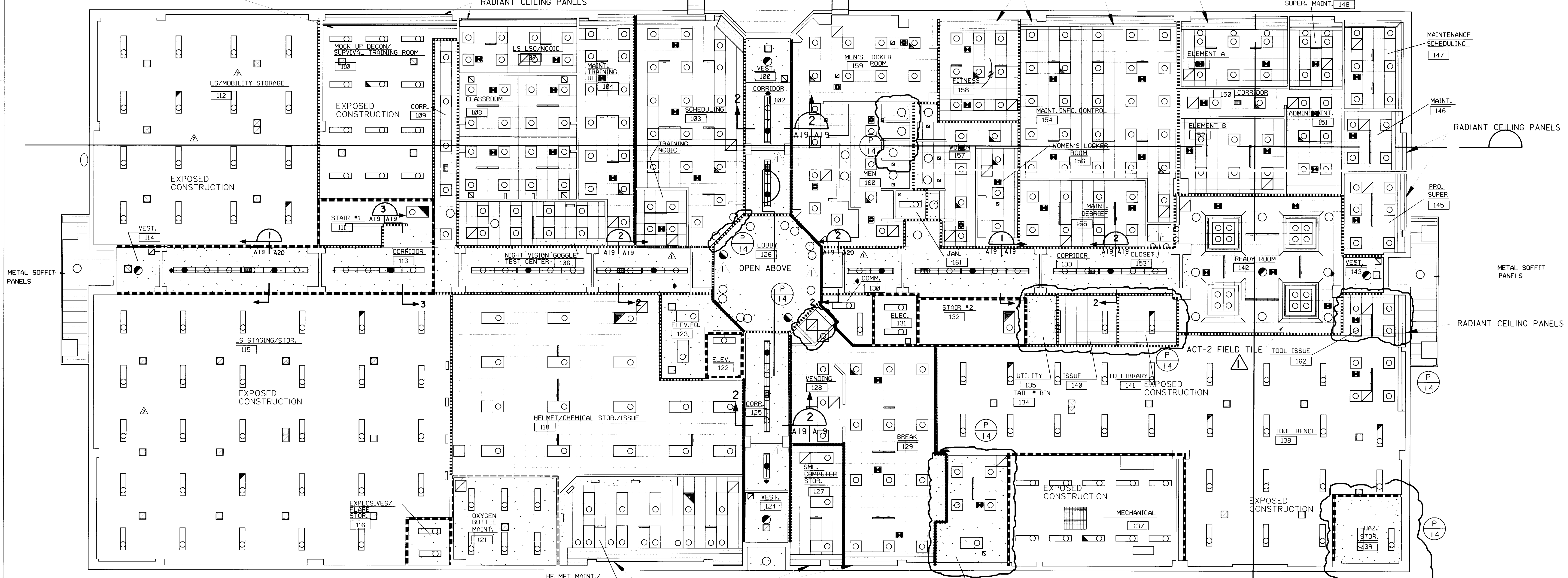
ADD SOFFIT FOR RADIANT CEILING PANEL. SIMILAR TO DETAIL A-40. NO OAK FINISH IS REQUIRED.

ACT-4 MOLDED CEILING TILE

METAL SOFFIT PANELS

NOTES:

- SEE SHTS. A-3 THRU A-10 FOR LOCATION OF FIRE EXTINGUISHERS.
- SEE SHTS. E-7 THRU E-9 FOR FIRE ALARM LOCATION.
- SEE SHTS. P-7 AND P-8 FOR FIRE SPRINKLER SYSTEM REQUIREMENTS.
- SEE SHT. E-1 THRU E-3 FOR EMERGENCY LIGHT LOCATIONS IN CORRIDORS.
- SEE SHEET A-49 FOR OPERABLE WALL PARTITION CEILING TRACK DETAILS FOR ROOM 108.
- CEILING SOFFIT DETAILS ARE SHOWN AS FOLLOWS:
RM 106 - SEE SHT A-33 DETAIL A
RM 117 - SEE SHT A-33 DETAIL A
RM 129 - SEE SHT A-32 DETAIL B
RM 105 - SEE SHT A-36 DETAIL E.
- SEE SHEET A-47 FOR CORRIDOR COLUMN AND ARCH DETAILS.
- SEE SHEET A-27 FOR DETAILS OF RESTROOM CEILING SOFFITS.
- BUILDING EXPANSION JOINTS WILL OCCUR IN FINISHED CEILINGS BETWEEN COLUMN B.1 & B.2 AND 1.1 & 1.2. EXPANSION JOINT COVERS SHALL BE ALUMINUM & VINYL. SEE SHT. A-49, DET. 19.
- REFLECTED CEILING PLAN REFLECTS FLOOR PLAN CHANGES AS PART OF THIS AMENDMENT.



6" STUD JOIST, 20 GAGE AT 16" O.C. WITH 5/8" GYP. BD, TOP SIDE

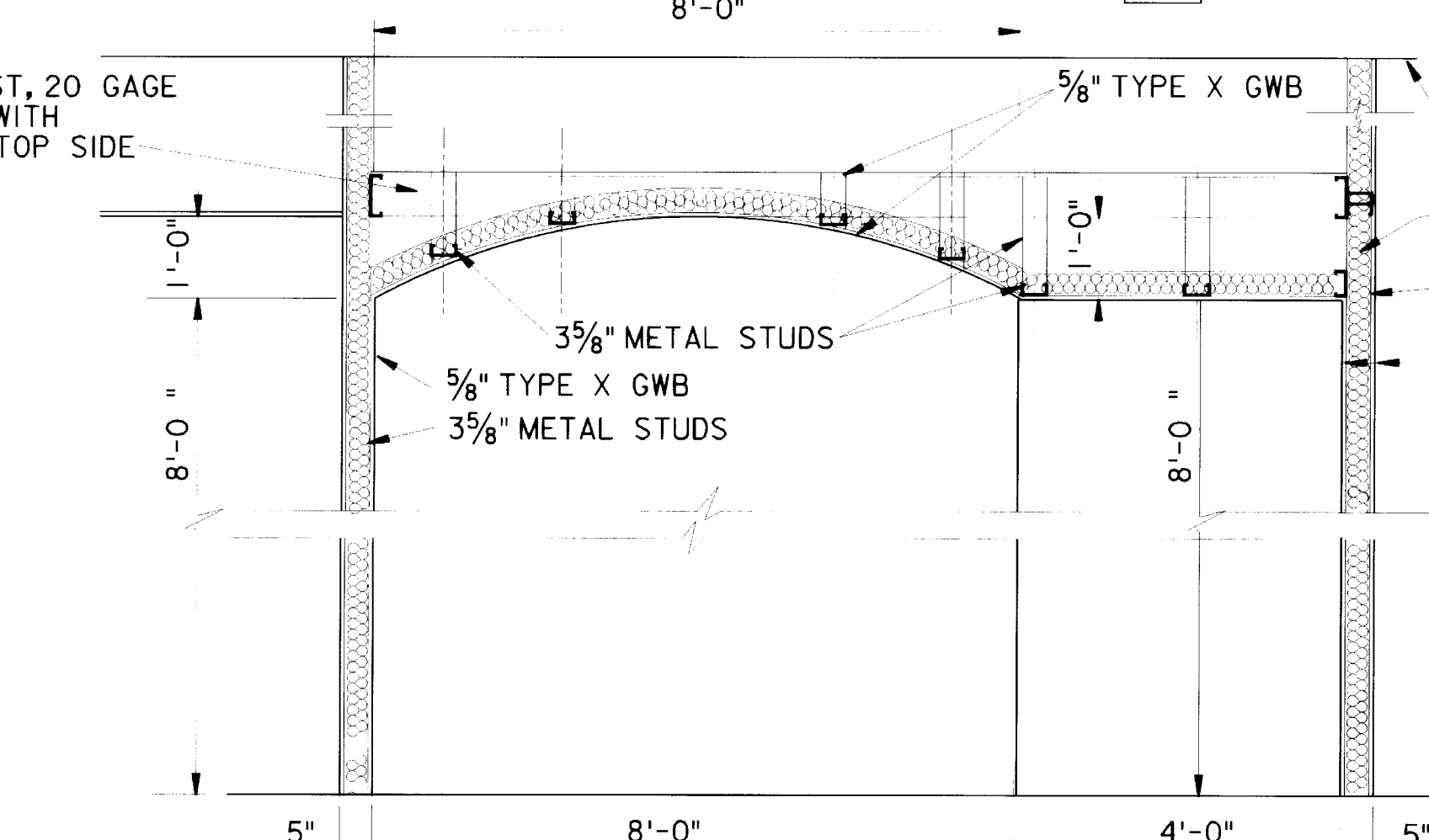
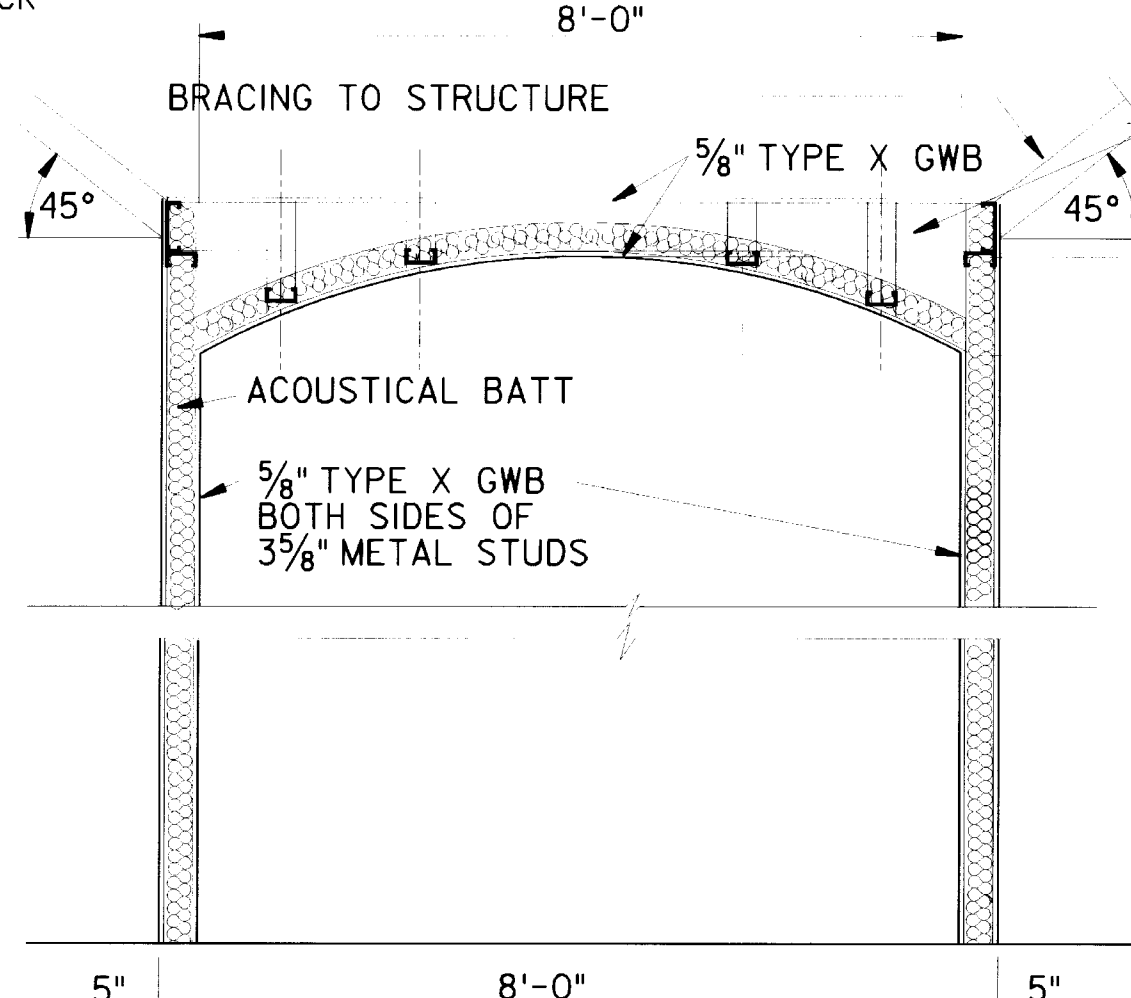
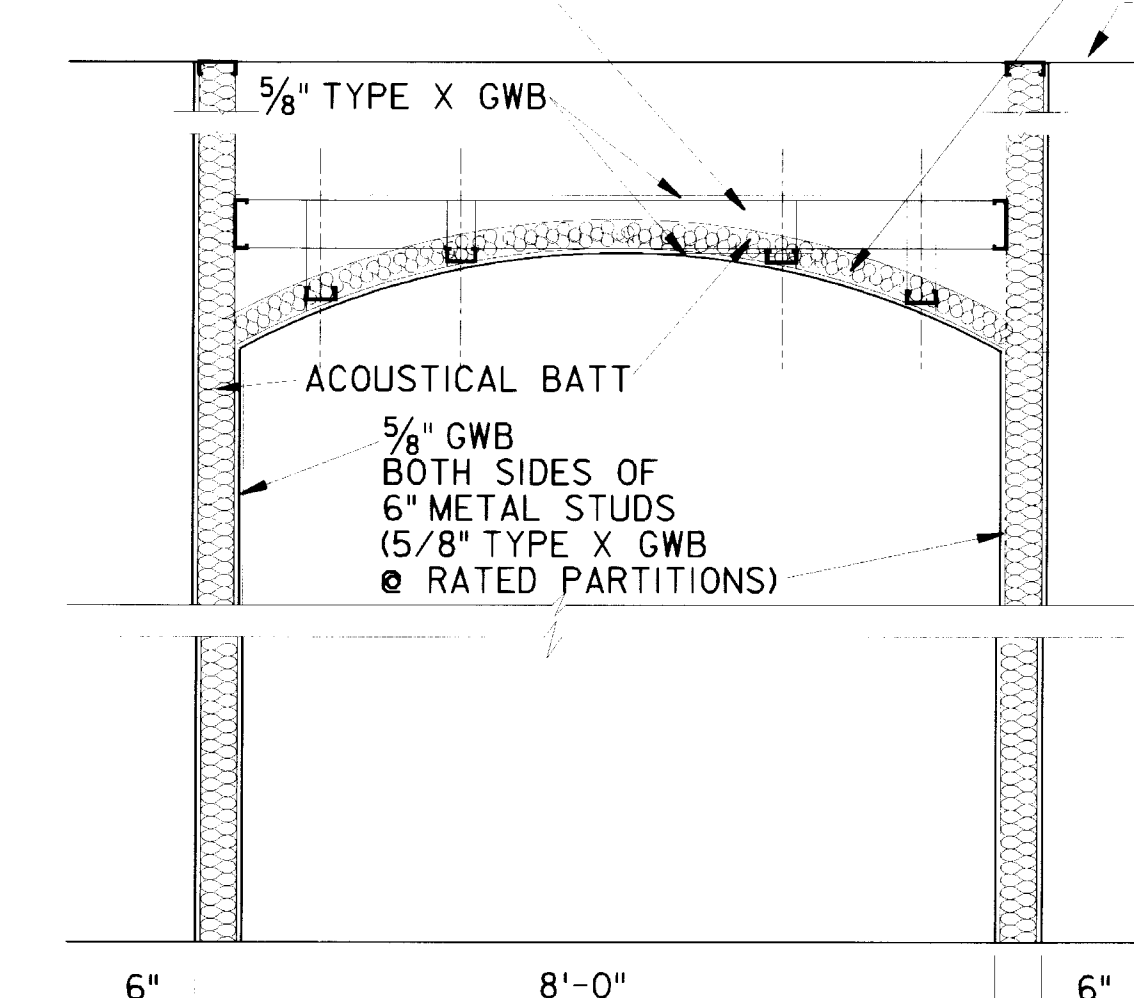
3/8" METAL STUDS METAL DECK

HELMET MAINT./ OXYGEN MASK REPAIR

RADIANT CEILING PANELS

6" STUD JOIST, 20 GAGE AT 16" O.C. WITH 5/8" GYP. BD, TOP SIDE

METAL DECK



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Symbol	Revisions	Date	Approved
1	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by:	SLH	Grand Forks AFB	NORTH DAKOTA
Drawn by:	SLH	PROJECT NO. JFSD963501	FY97
Checked by:	JDB	SQUADRON OPERATIONS/AMU	
Submitted by:	JDB		
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Date:	FEBRUARY 1997	Design File:	G500A019.3D
Dwg. No.:	AF 141-753-01	File No.:	

631-00- 156-53 A-19

5

4

3

2

1

D

C

B

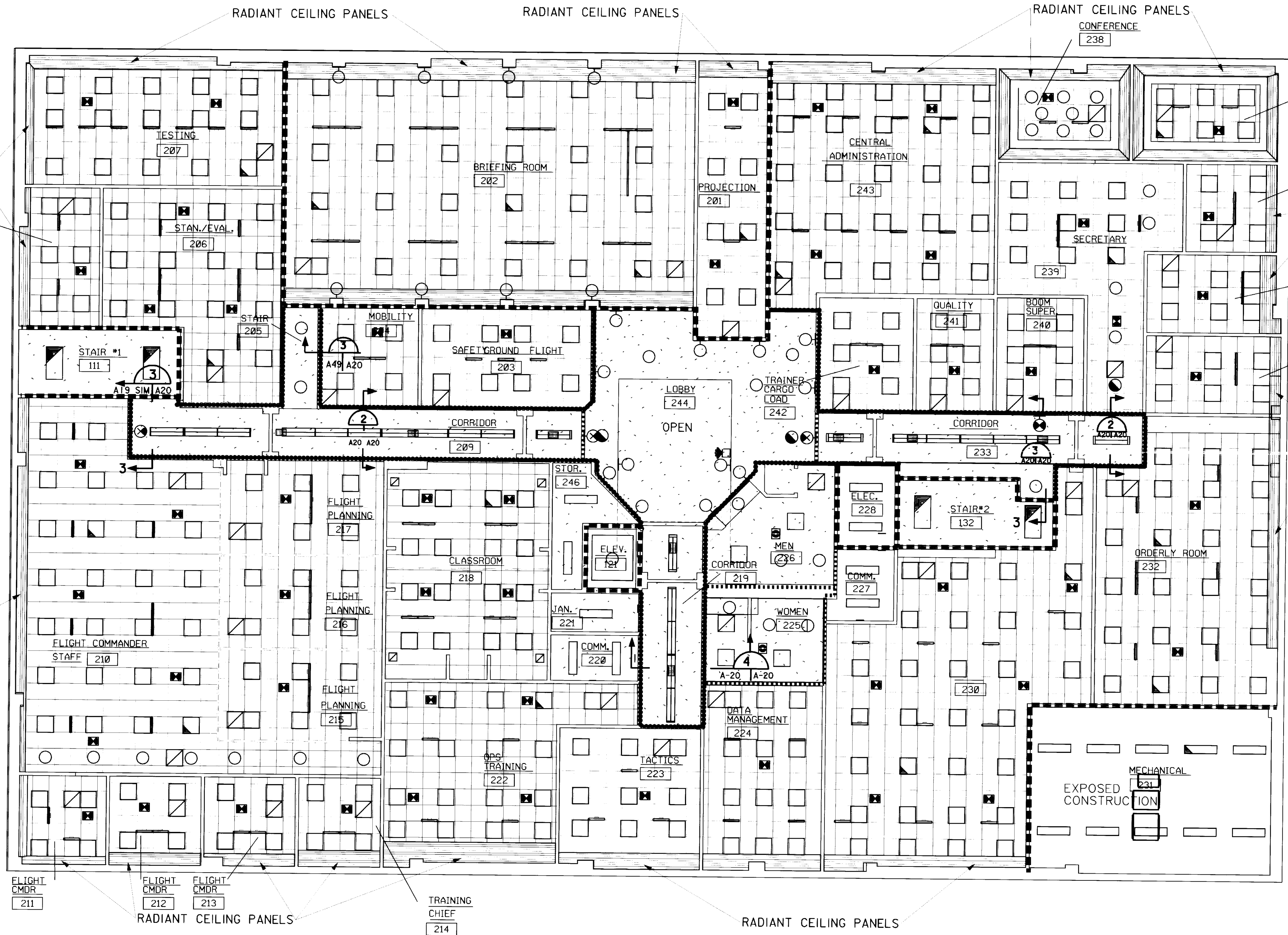
A

D

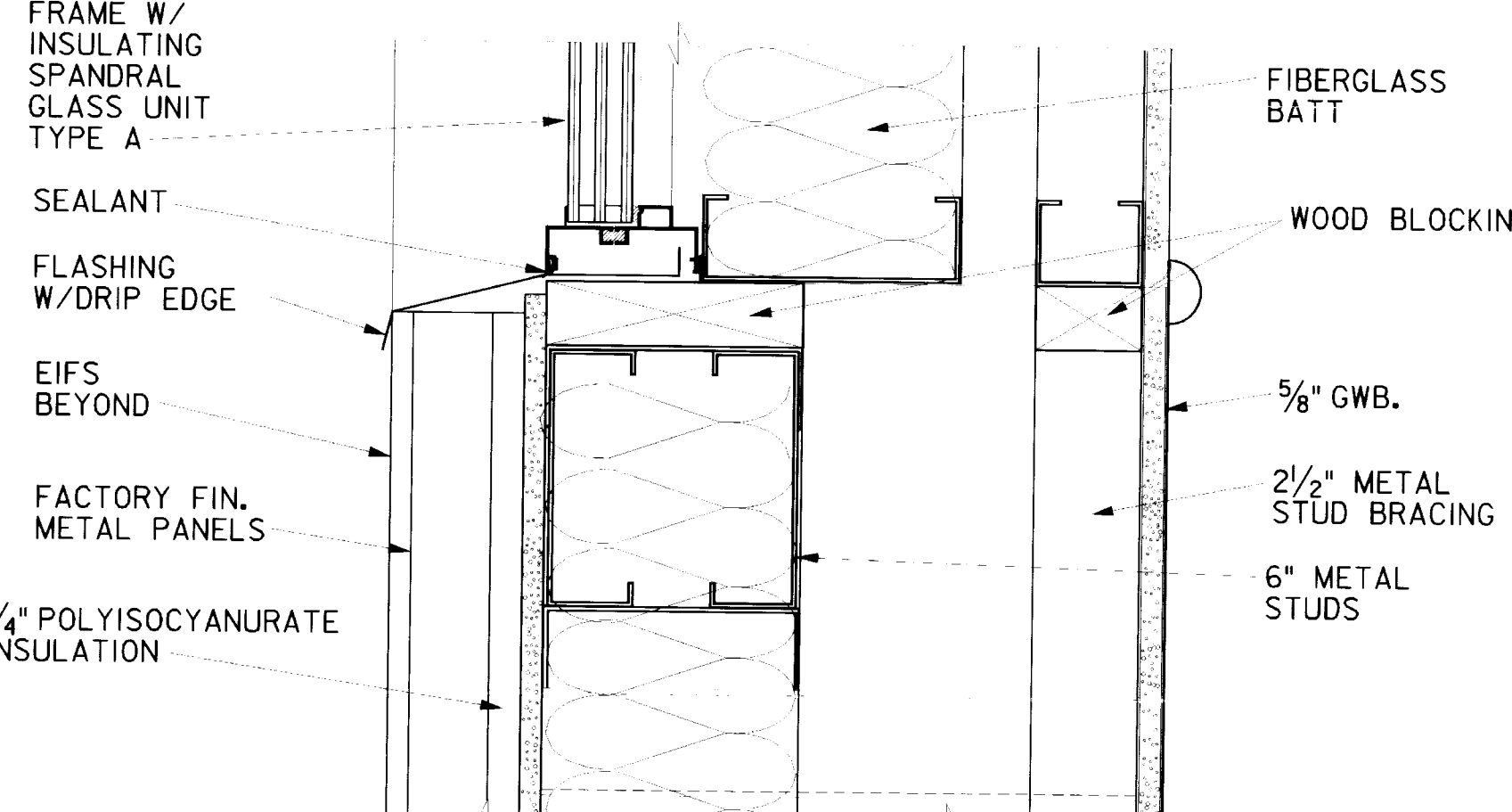
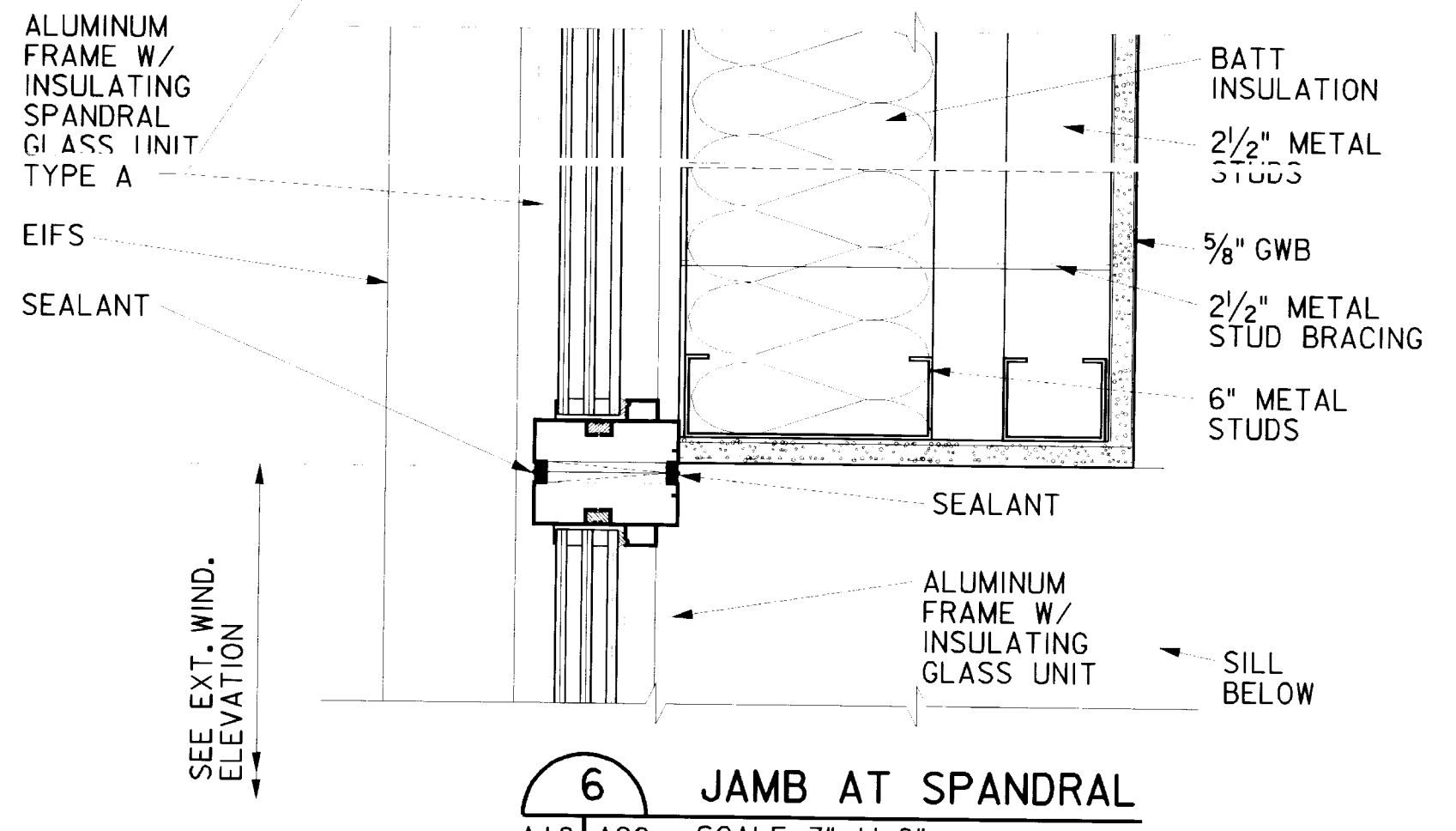
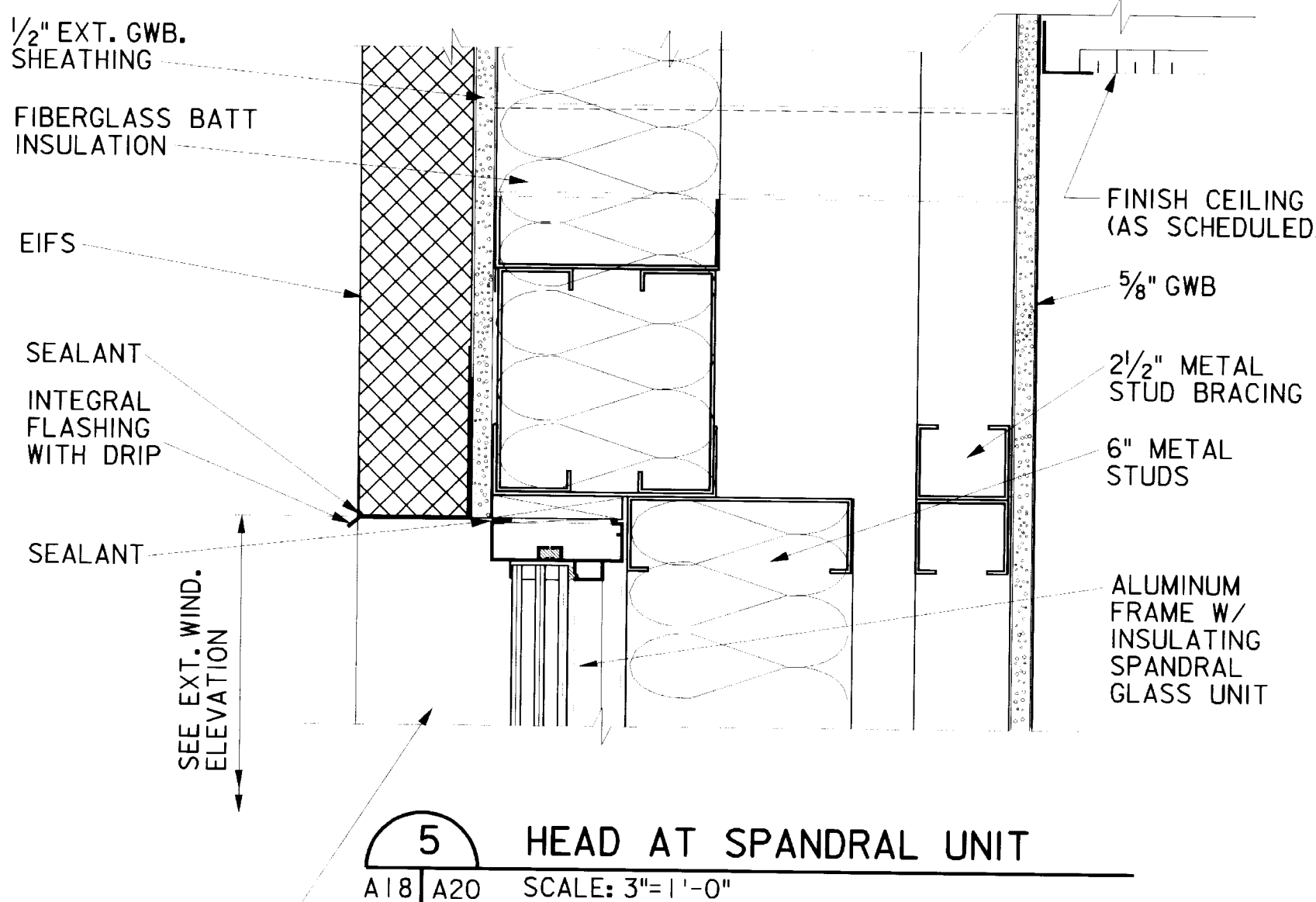
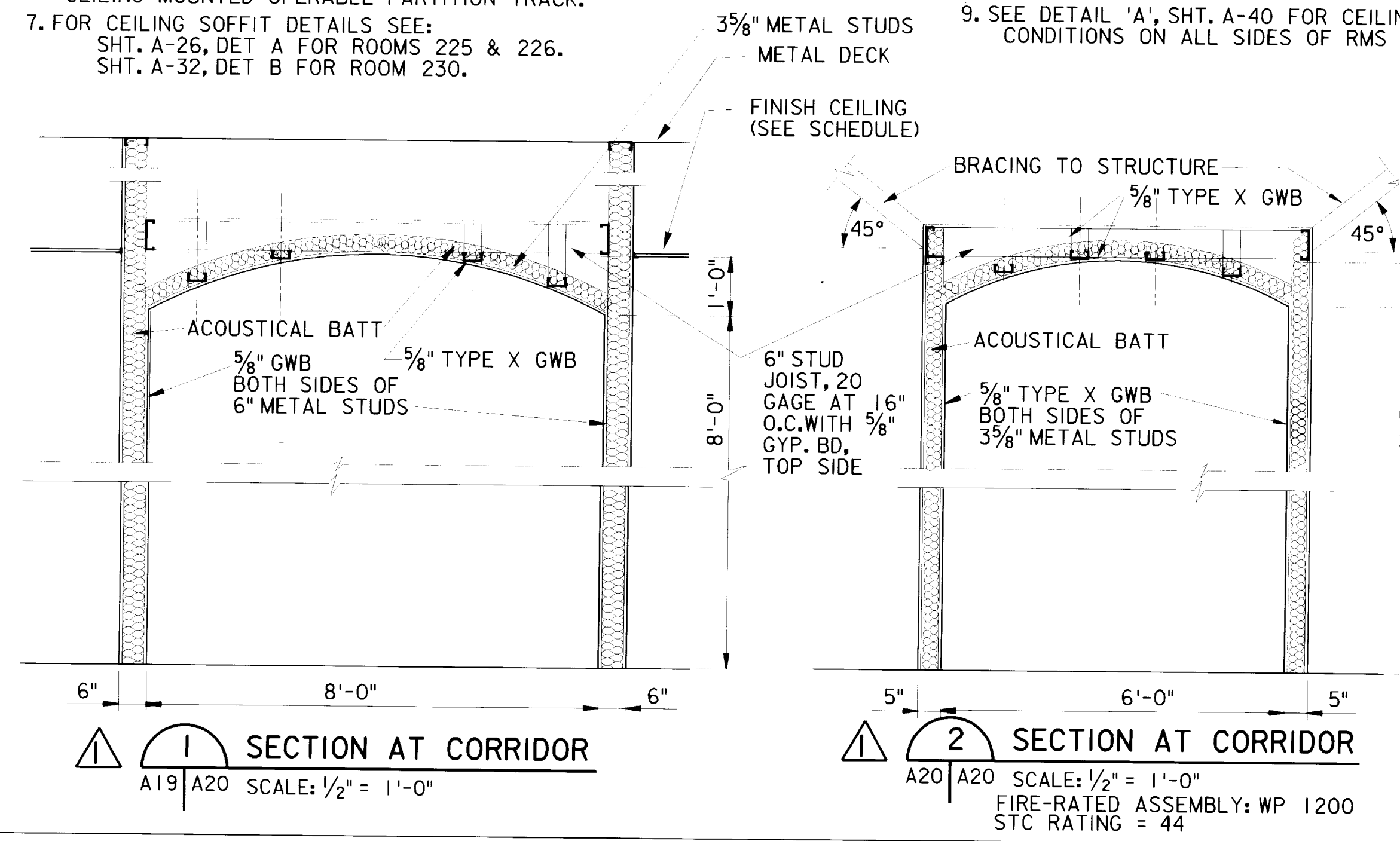
C

B

A



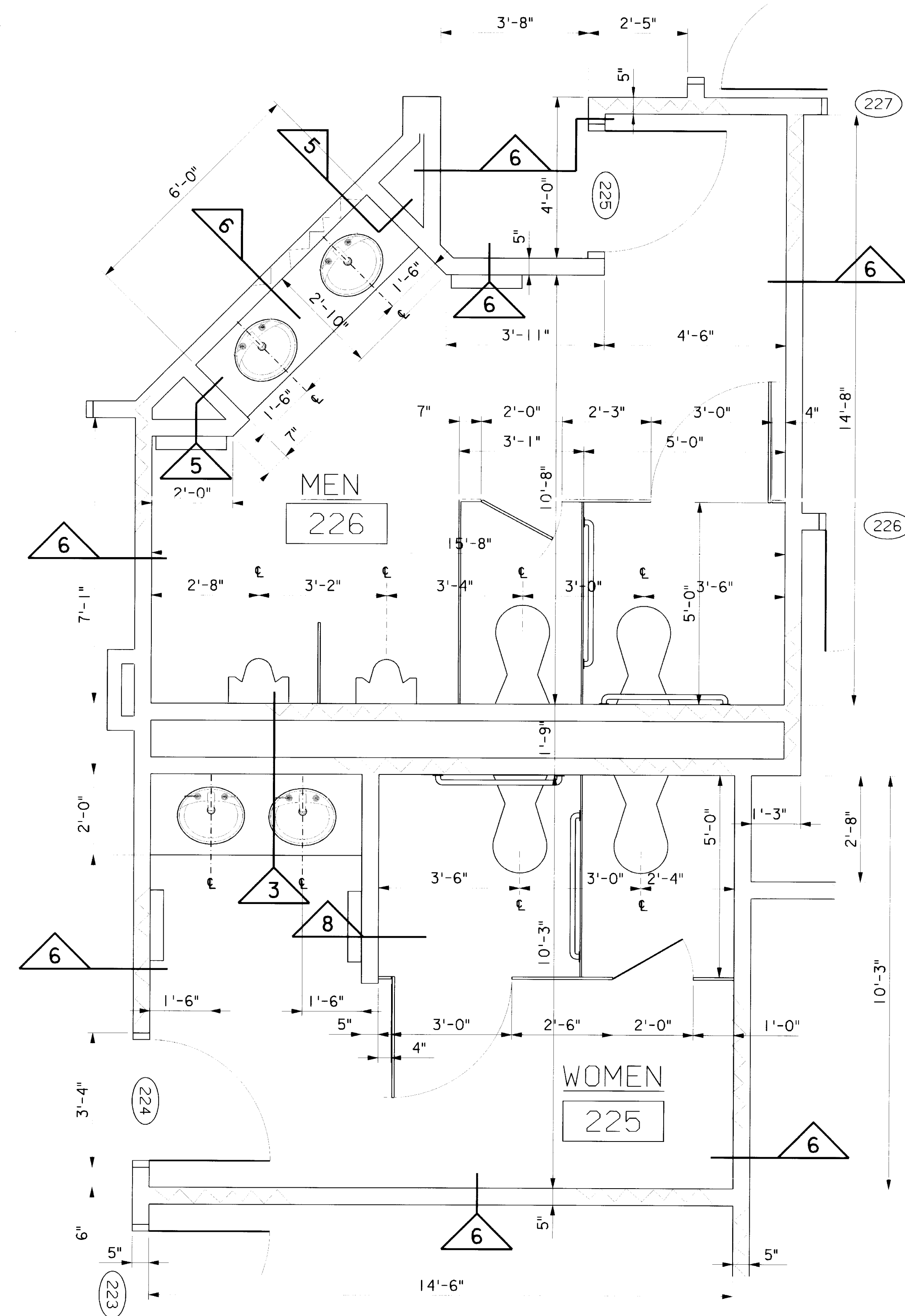
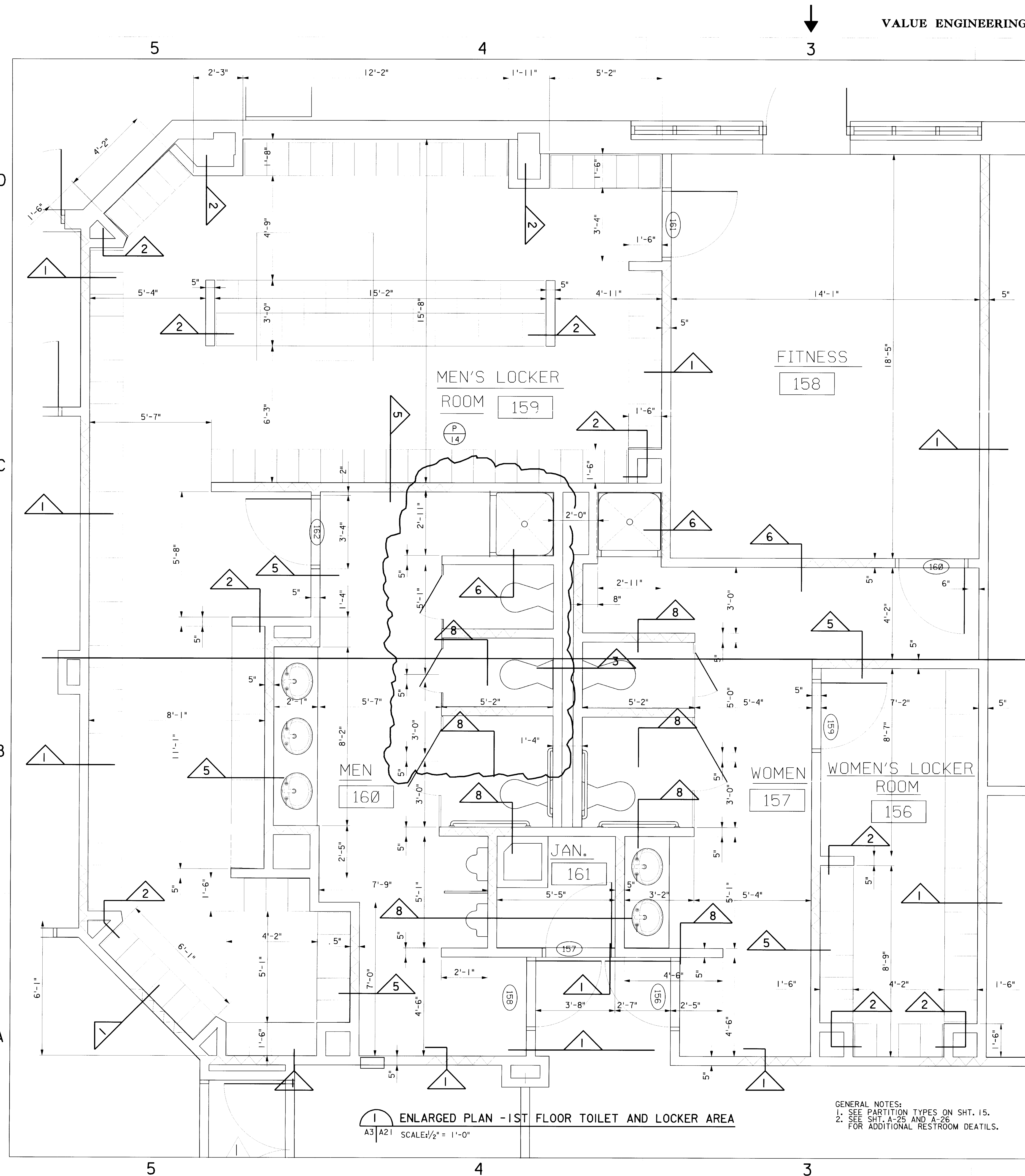
- NOTES:
1. SEE SHTS. A-3 THRU A-10 FOR LOCATION OF FIRE EXTINGUISHERS.
 2. SEE SHTS. E-7 THRU E-9 FOR FIRE ALARM LOCATION.
 3. SEE SHTS. P-7 AND P-8 FOR SPRINKLER SYSTEM REQUIREMENTS.
 4. SEE SHT. E-1 AND P-8 FOR EMERGENCY LIGHT LOCATIONS IN CORRIDORS.
 5. SEE DETAIL 13, SHT. A-18 FOR TYPICAL DETAIL AT HEAD OF CASED OPENING FROM LOBBY 244 TO CORRIDORS.
 6. SEE DETAIL 1, SHT. A-49 FOR TYPICAL DETAIL AT CEILING MOUNTED OPERABLE PARTITION TRACK.
 7. FOR CEILING SOFFIT DETAILS SEE:
SHT. A-26, DET A FOR ROOMS 225 & 226.
SHT. A-32, DET B FOR ROOM 230.



1. COORDINATE FLOOR PLANS FOR WALL THICKNESSES:
A) WITH STRUCTURAL BRACING
EIFS: 1'-6 3/4"
B) WITHOUT STRUCTURAL BRACING
EIFS: 10 3/8"

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	SLH	SECOND FLOOR REFLECTED CEILING/ FIRE PROTECTION PLAN	
Checked by:	JDB	Scale: AS SHOWN	Sheet number: 8 of 1
Submitted by:	JDB	Date: FEBRUARY 1997	Plot Scale: 8:1
		Dwg. No.: AF 141-753-01	Design File: G501A020.3D
			File No.:

63100-156-54 A-20



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

SCALE IN FEET

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	SLH	EXPANDED FLOOR PLANS	
Checked by:	JDB	Scale: 1/2" = 1'-0"	Sheet number: 2:1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G500A021.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000- 156-55 A-21

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR		BASE		NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING				REMARKS				
		MAT	COL	MAT	COL	MAT	FIN	COL	MAT	FIN	COL	MAT	FIN	COL	MAT	FIN	COL		HGT			
100	VESTIBULE	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	A			
101	NOT USED																					
102	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D			
103	SCHEDULING	CP	3	RB	1	GWB	VWC	3	GWB	PT	3	GWB	PT	3	GWB	VWC	3	ACT	1	-	9-0	
104	MAINTENANCE TRAINING	CP	3	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	3	GWB	PT	3	ACT	1	-	9-0	
105	TRAINING NCOIC	CP	3	RB	1	GWB	PT	3	GWB	VWC	3	GWB	VWC	3	GWB	PT	3	ACT	1	-	9-0	
106	NIGHT VISION GOGGLES	VCT	1	RB	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	ACT	2	-	9-0	E
107	LS LSO/NCOIC	CP	3	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	3	GWB	VWC	3	ACT	1	-	9-0	
108	CLASSROOM	CP	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	F
109	CORRIDOR	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	ACT	1	2	8-0	D, CC
110	MOCK UP DECON	CS	2	RB	2	GWB	PT	1	CMU	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	9	VARIES	P
111	STAIR	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	ST	1	VARIES	G, H, I, J
112	L/S MOBILITY STOR.	CS	2	RB	2	CMU	PT	1	CMU	PT	1	GWB	PT	1	GWB	PT	1	EXP	PT	9	VARIES	P, EE
113	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
114	VESTIBULE	CS	1	RB	3	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	ST	1	9-0	K
115	LS STAGING/STOR.	CS	2	RB	2	CMU	PT	1	GWB	PT	1	GWB	PT	1	CMU	PT	1	EXP	PT	9	VARIES	E, P, EE
116	HAZ. STOR.	CS	2	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
117	HELMET MAINTENANCE	VCT	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	ACT	2	-	8-0	E
118	HELMET/CHEM. STOR.	VCT	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	ACT	2	-	9-0	E
119	NOT USED																					
120	NOT USED																					
121	OXY. BOTTLE MAINT.	VCT	1	RB	2	CMU	PT	1	CMU	PT	1	CMU	PT	1	GWB	PT	1	GWB	PT	9	8-0	E, CC
122	ELEVATOR	-	-	-	-	CMU	-	-	CMU	-	-	CMU	-	-	-	-	-	-	-	-	-	L
123	ELEVATOR EQUIP.	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
124	VESTIBULE	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	ST	1	9-0	A
125	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
126	LOBBY	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	10-0	B, M
127	SM. COMPUTER ROOM	CP	3	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	10-0	
128	VENDING	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	ACT	1	-	9-0	N
129	BREAK	PFT	1,2,3	PFTB	1	GWB	VWC	1	GWB	AWC	1	GWB	VWC	1	GWB	VWC	1	ACT	1	-	9-0	E, O
130	COMMUNICATIONS	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	EXP	-	-	VARIES	
131	ELECTRICAL	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	EXP	-	-	VARIES	
132	STAIR	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	ST	1	VARIES	G, H, I, J
133	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
134	TAIL * BIN	CS	2	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	EXP	PT	9	VARIES	E, P
135	UTILITY	CS	2	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	ST	1	9-0	
136	OUTSIDE STORAGE	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	CMU	PT	1	GWB	PT	2	9-0	
137	MECHANICAL	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	CMU	PT	1	EXP	-	-	VARIES	
138	TOOL BENCH	CS	2	RB	2	GWB	PT	1	GWB	PT	1	CMU	PT	1	CMU	PT	1	EXP	PT	9	VARIES	E, P, GG
139	HAZ. STORAGE	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
140	ISSUE	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
141	TO LIBRARY	CP	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
142	READY ROOM	PFT	1,2,3	PFTB	1	GWB	VWC	1	GWB	VWC	1	GWB	VWC	1	GWB	VWC	1	ACT	2,4	-	9-0	B
143	VESTIBULE	CS	1	RB	3	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	ST	1	9-0	K
144	(NOT USED)																					
145	PRO. SUPER.	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
146	MAINTENANCE	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
147	CONFERENCE ROOM	CPT	1	RB	1	GWB	VWC	2	GWB	VWC	2	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
148	MAINT. SUPER.	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
149	ELEMENT 'A'	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
150	CORRIDOR	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
151	MAINT. ADMIN	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
152	ELEMENT 'B'	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
153	CLOSET	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	2	9-0	
154	MAINT. INFO. CONTROL	PFT	1,2,3	PFTB	1	GWB	VWC	3	GWB	PT	3	GWB	PT	3	GWB	VWC	3	ACT	1	-	9-0	
155	MAINT. DEBRIEF.	CPT	1	RB	1	GWB	PT	3	GWB	VWC	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
156	WOMEN'S LOCKERS	CP	3	PFTB	3	GWB	PT	4	GWB	PT	4	GWB	PT	4	GWB	PT	4	ACT	3	-	9-0	Q, R
157	WOMEN	PFT	5	PFTB	3	GWB	CWT	1,2,4	GWB	CWT	1,2,4	GWB	CWT	1,2,4	GWB	CWT	1,2,4	ACT	3	-	9-0	S, U, W
158	FITNESS	CP	3	RB	1	GWB	WM	-	GWB	PT	1	GWB	WM	-	GWB	WM	-	ACT	3	-	9-0	DD
159	MEN'S LOCKERS	CP	3	PFTB	2	GWB	PT	5	GWB	PT	5	GWB	PT	5	GWB	PT	5	ACT	3	-	9-0	Q, R
160	MEN	PFT	4	PFTB	2	GWB	CWT	1,3,4	GWB	CWT	1,3,4	GWB	CWT	1,3,4	GWB	CWT	1,3,4	ACT	3	-	9-0	S, T, W
161	JANITOR	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
162	TOOL ISSUE	RT	1	RB	3	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	ACT	2	-	9-0	

EXTERIOR FINISH LEGEND

SURFACE	COLOR	REMARKS
STANDING SEAM ROOF AND ACCESSORIES	PPG DURANAR/DARK BRONZE	
GUTTER, DOWNSPOUTS, AND LOUVERS	DARK BRONZE	
FASCIA	DARK BRONZE	
EIFS #1	FSC X3578	
EIFS #2	FSC X0045	
METAL SOFFIT AND ACCESSORIES	FSC 23578	
ALUMINUM ENTRANCE DOOR	KAWNEER	ANODIZED, #40 DARK BRONZE
HOLLOW METAL DOORS AND FRAMES	FSC X0045 DARK BROWN	
OVERHEAD DOORS AND FRAMES	FSC X0045 DARK BROWN	
ALUMINUM WINDOWS	DARK BRONZE	
WINDOW GLASS	BRONZE EXTERIOR	INSULATING GLASS - TRIPLE GLAZED
ELECTRICAL TRANSFORMER HOUSING	FSC X3578	
LIGHT POLE AND FIXTURES	SEE SPEC. SECT. 16415	
MECHANICAL EQUIPMENT	FSC X3578	
TRASH DUMPSTER GATE	FSC X3578	
MECHANICAL ENCLOSURE SCREEN	FSC X3578	

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR		BASE		NORTH WALL			EAST WALL			SOUTH WALL			WEST WALL			CEILING				REMARKS
		MAT	COL	MAT	COL	MAT	FIN	COL	MAT	FIN	COL	MAT	FIN	COL	MAT	FIN	COL	MAT	FIN	COL	HGT	
200	NOT USED																					
201	PROJECTION ROOM	VCT	1	RB	2	GWB	PT	12	GWB	PT	12	GWB	PT	12	GWB	PT	12	ACT	1	-	9-0	
202	BRIEFING ROOM	CP	1	WB	-	GWB	AWP	1	GWB	AWP	1	GWB	AWP	1	GWB	AWP	1	ACT	6	-	10-0	V, Y
203	FLT. GROUND SAFE.	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
204	MOBILITY	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
205	STAIR	PFT	1	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	-	AWC	1	GWB	ST	1	VARIES	G, H, I, J
206	STAN./EVAL.	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	3	GWB	VWC	3	ACT	1	-	9-0	
207	TESTING	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
208	MANUAL CONTROL	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	GWB	PT	3	GWB	VWC	2	ACT	1	-	9-0	
209	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
210	FLT. COMM. STAFF	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	-	-	-	GWB	PT	3	ACT	1	-	9-0	
211	FLIGHT CMDR	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
212	FLIGHT CMDR	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	GWB	PT	3	GWB	VWC	2	ACT	1	-	9-0	
213	FLIGHT CMDR	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
214	TRAINING CHIEF	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	ACT	1	-	9-0	
215	FLIGHT PLANNING	CPT	1	RB	1	OWP	-	-	OWP	-	-	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	F
216	FLIGHT PLANNING	CPT	1	RB	1	OWP	-	-	OWP	-	-	GWB	PT	3	OWP	-	-	ACT	1	-	9-0	F
217	FLIGHT PLANNING	CPT	1	RB	1	OWP	-	-	GWB	PT	3	GWB	PT	3	OWP	-	-	ACT	1	-	9-0	F
218	CLASSROOM	CP	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	F
219	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	-	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
220	COMMUNICATIONS	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
221	JAN.	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	
222	OPS TRAINING	CPT	1	RB	1	GWB	VWC	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
223	TACTICS	CPT	1	RB	1	GWB	VWC	3	GWB	VWC	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
224	DATA MANAGEMENT	CPT	1	RB	1	GWB	PT	3	GWB	VWC	3	GWB	VWC	3	GWB	PT	3	ACT	1	-	9-0	
225	WOMEN	PFT	5	PFTB	3	GWB	CWT	1,2,4	GWB	CWT	1,2,4	GWB	CWT	1,2,4	GWB	CWT	1,2,4	GWB	ST	1	9-0	STAIR
226	MEN	PFT	4	PFTB	2	GWB	CWT	1,3,4	GWB	CWT	1,3,4	GWB	CWT	1,3,4	GWB	CWT	1,3,4	GWB	ST	1	8-0	S, U, W
227	COMM.	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	-	-	12-0	
228	ELEC.	CS	1	RB	2	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	-	-	12-0	
229	NOT USED																					
230	ACE	CPT	1	RB	1	GWB	VWC	3	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
231	MECHANICAL	CS	3	RB	2	GWB	PT	1	GWB	PT	1	CMU	PT	1	CMU	PT	1	EXP	1	-	VARIES	
232	ORDERLY ROOM	CPT	1	RB	1	GWB	VWC	3	GWB	PT	3	GWB	PT	3	GWB	VWC	3	ACT	1	-	9-0	E, O
233	CORRIDOR	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	9-0	B, C, D
234	OPS. OFFICER	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
235	1ST SGT.	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
236	XO	CPT	1	RB	1	GWB	PT	3	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	ACT	1	-	9-0	
237	COMMANDER	CP	2	WB	-	GWB	FWC	2	GWB	FWC	2	GWB	FWC	2	GWB	FWC	2	ACT	5	-	9-0	Z
238	CONFERENCE	CP	2	WB	-	GWB	FWC	2	GWB	FWC	2	GWB	FWC	2	GWB	FWC	2	ACT	5	-	9-0	Z
239	SECRETARY	CPT	1	RB	1	GWB	VWC	2	GWB	PT	3	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
240	BOOM SUPER.	CPT	1	RB	1	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
241	QUALITY	CPT	1	RB	1	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
242	CHIEF CARGO LOAD	CPT	1	RB	1	GWB	VWC	2	GWB	VWC	2	GWB	PT	3	GWB	PT	3	ACT	1	-	9-0	
243	CENTRAL ADMIN.	CPT	1	RB	1	GWB	PT	3	GWB	PT	3	GWB	VWC	3	GWB	PT	3	ACT	1	-	9-0	E, O
244	LOBBY	PFT	1,2,3	PFTB	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	AWC	1	GWB	PT	2	10-0	B, X
245	NOT USED																					
246	STORAGE	VCT	1	RB	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	1	GWB	PT	2	9-0	

INTERIOR FINISH LEGEND						
CATEGORY	DESIG.	ITEM	MANUFACTURER	NAME/COLOR	MANUF. NO.	REMARKS
FLOORS	CPT-1	CARPET TILE	COLLINS & AIKMAN	MONET SL/CHAMELEON	27600	18" SQ W/BACKING
	CP-1	CARPET	MOHAWK	HOBNAIL II/OPAL	HOB/603	12 FT. WIDE; PRIMEX PLUS BACKING
	CP-2	CARPET	SHAW INDUSTRIES	POPPY HILLS/AUBERGINE	50113/13890	12 FT. WIDE;
	CP-3	CARPET	SHAW COMMERCIAL	BELLEMEADE/MANHATTAN	50239/39544	12 FT. WIDE; IMPACT #165 BACKING
	PFT-1	PORCELAIN FLOOR TILE	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	12" SQ. x 3/8" THICK; SLATE TEXTURED SURFACE
	PFT-2	PORCELAIN FLOOR TILE	CROSSVILLE	CROSS-COLORS/MICA UP I	A900	12" SQ. x 3/8" THICK; SLATE TEXTURED SURFACE
	PFT-3	PORCELAIN FLOOR TILE	CROSSVILLE	CROSS-COLORS/ONYX UP II	A880	12" SQ. x 3/8" THICK; SLATE TEXTURED SURFACE
	PFT-4	PORCELAIN FLOOR TILE	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	8" SQ. x 3/8" THICK; UNPOLISHED SURFACE
	PFT-5	PORCELAIN FLOOR TILE	CROSSVILLE	CROSS-COLORS/MICA UP I	A900	8" SQ. x 3/8" THICK; UNPOLISHED SURFACE
	PST-1	PORCELAIN TILE STAIR TREADS	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	4"x8"x3/8" THICK; BULLNOSE EDGE
	PSR-1	PORCELAIN TILE STAIR RISER	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	8" SQ. x 3/8" THICK; FIELD CUT TO FIT
	VCT-1	VINYL COMPOSITION TILE	AZROCK	CLASSIC GRANITE/CLASSIC TAN	VL-124	12" SQ. x 1/8" THICK
	CS-1	CONCRETE SEALER	MASTER BUILDERS	MASTERKURE	-	ONE COMPONENT SYSTEM
	CS-2	CONCRETE HARDENER	-	LIPIDOLITH	-	MOD. P00009
BASES	RT-1	RAISED RUBBER DOT FLOORING	ROPPE	CIRCULAR DESIGN, LOW PROFILE	174/SMOKE	1/8" THICK; 19 1/8" SQ. TILES; *SEE NOTE D
	RB-1	RUBBER BASE	ROPPE	COVED TOE STD./SMOKE	74	1/8" THICK; 4" HIGH
	RB-2	RUBBER BASE	ROPPE	COVED TOE STD./BLACK	00	1/8" THICK; 4" HIGH
	RB-3	RUBBER BASE	ROPPE	STRAIGHT/BLACK	00	1/8" THICK; 4" HIGH
	PFTB-1	PORCELAIN FLOOR TILE BASE	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	STRAIGHT BASE 4"x8"; BULLNOSE PROFILE
	PFTB-2	PORCELAIN FLOOR TILE BASE	CROSSVILLE	CROSS-COLORS/STONEHENGE	A675	COVE BASE 6" H x 8" W; SET-ON TYPE
	PFTB-3	PORCELAIN FLOOR TILE BASE	CROSSVILLE	CROSS-COLORS/MICA UP I	A900	COVE BASE 6" H x 8" W; SET-ON TYPE
	WDB	WOOD WALL BASE	-	SOLID OAK	-	WDF-1 FINISH
	WDF-1	WOOD FINISH	-	-	-	-
	-	STAIN	SHERWIN WILLIAMS	-	A 48	TO MATCH WILSONART LAMINATE #7816
CASEWORK	-	POLYURETHANE	SHERWIN WILLIAMS	-	A 67 F I	SATIN FINISH
	WDF-2	WOOD FINISH	-	-	-	-
	-	STAIN	SHERWIN WILLIAMS	-	A 48	SEMI-OPAQUE BLACK
	-	POLYURETHANE	SHERWIN WILLIAMS	-	A 67 F I	SATIN FINISH
	PL-1	PLASTIC LAMINATE	WILSONART	FAIENCE/MATTE FINISH	4617-60	GENERAL PURPOSE GRADE (GP) 107
	PL-2	PLASTIC LAMINATE	WILSONART	FEATHERSTONE/MATTE FINISH	72-60	CABINET LINER GRADE 726
	PL-2A	PLASTIC LAMINATE	WILSONART	FEATHERSTONE/CRYSTAL FINISH	72-90	GENERAL PURPOSE GRADE (GP) 107
	PL-3	PLASTIC LAMINATE	WILSONART	STORM NEBULA/CRYSTAL FINISH	4634-90	TUFSURF II/POSTFORMING GRADE (PF) 350HW
	PL-4	PLASTIC LAMINATE	WILSONART	TAUPESTONE/MATTE FINISH	D368-60	GENERAL PURPOSE GRADE (GP) 107
	PL-5	PLASTIC LAMINATE	WILSONART	WHITE NEBULA/MATTE FINISH	4621-60	GENERAL PURPOSE GRADE (GP) 107
	PL-6	PLASTIC LAMINATE	WILSONART	BLACK/MATTE FINISH	1595-60	GENERAL PURPOSE GRADE (GP) 107
	SSM-1	SOLID SURFACING MATERIAL	CORIAN	SUMMIT/KILIMANJARO	-	1/2" THICK
	SSM-2	SOLID SURFACING MATERIAL	CORIAN	MALACHITE	-	1/2" THICK
	SSM-3	SOLID SURFACING MATERIAL	CORIAN	SIERRA/PINK CORAL	-	1/2" THICK
WALLS	SSM-4	SOLID SURFACING MATERIAL	CORIAN	ECLIPSE	-	1/2" THICK
	VWC-1	VINYL WALLCOVERING	LANARK	NAGANO/NUTMEG	L2-NG-17	54" WIDE
	VWC-2	VINYL WALLCOVERING	TOWER	HELIOS/MALT	T1-HE-11	54" WIDE
	VWC-3	VINYL WALLCOVERING	TOWER	GEDSO/CORNERSTONE	T1-GS-25	54" WIDE
	FWC-1	FABRIC WALLCOVERING	MDC	BEDFORD/BAYBERRY	19-41	54" WIDE
	FWC-2	FABRIC WALLCOVERING	MAHARAM	BOTANICO/CERISE	302705/06	54" WIDE
	CWT-1	CERAMIC WALL TILE	AMERICAN OLEAN	BRIGHT & MATTE/MATTE CHESTNUT	53	4 1/2" SQ. x 3/8" THICK; FIELD COLOR
	CWT-2	CERAMIC WALL TILE	AMERICAN OLEAN	DESIGNER ACCENTS/BURGUNDY	SD5/110	4 1/4" SQ. x 3/8" THICK; SCORED ACCENT COLOR
	CWT-3	CERAMIC WALL TILE	AMERICAN OLEAN	DESIGNER ACCENTS/TEAL	SD5/119	4 1/4" SQ. x 3/8" THICK; SCORED ACCENT COLOR
	CWT-4	CERAMIC WALL TILE	AMERICAN OLEAN	SIZZLE STRIP/GLOSS BLACK	P612/49	6" x 1/2" x 3/8" THICK FEATURE STRIP
	PT-1	PAINT	GLIDDEN	LATEX ENAMEL/STRATOSPHERE	40YY 73/028	SEMIGLOSS LUSTER
	PT-2	PAINT	GLIDDEN	LATEX/NATURAL WHITE	50YY 83/029	FLAT LUSTER
	PT-3	PAINT	GLIDDEN	LATEX/WOODWIND	20YY 74/055	SATIN LUSTER
	PT-4	PAINT	GLIDDEN	LATEX ENAMEL/KITTEN WHITE	30YY 78/035	SEMIGLOSS LUSTER
	PT-5	PAINT	GLIDDEN	LATEX ENAMEL/UNICORN WHITE	10YY 64/048	SEMIGLOSS LUSTER
	PT-6	PAINT	GLIDDEN	ALKYD ENAMEL/DARK SECRET	00NN 05/000	SEMIGLOSS LUSTER
	PT-7	PAINT	GLIDDEN	ALKYD ENAMEL/BASIC BEIGE	45YY 65/084	SEMIGLOSS LUSTER
	PT-8	PAINT	GLIDDEN	ALKYD ENAMEL/LIGHT TAUPE	90YR 34/062	SEMIGLOSS ENAMEL
	PT-9	PAINT	GLIDDEN	LATEX/ULTRA-HIDE DRY FOG	Y-5023	FLAT WHITE LUSTER; SPRAY APPLICATION
	PT-10	PAINT	GLIDDEN	LATEX ENAMEL/TAUPEWOOD	90YR 34/084	SEMIGLOSS LUSTER
	PT-11	PAINT	GLIDDEN	LATEX ENAMEL/IRON CREEK	30BG 15/062	SEMIGLOSS LUSTER
	PT-12	PAINT	GLIDDEN	LATEX/DARK SECRET	00NN 05/000	SATIN LUSTER
	AWP	ACOUSTICAL WALL PANEL FABRIC	MAHARAM	TEK-WALL LASER/BROOK GREY	302902/35	100% POLYOLEFIN; 54" WIDE
	OWP	OPERABLE WALL PARTITION	MODERNFOLD	MDC/BEDFORD/BAYBERRY	19-41	WALL PANEL FABRIC COVERING
	GB	GLASS BLOCK	CORNING PC	REGULAR SERIES/DECORA	-	SEE DWGS FOR BLOCK DIMENSIONS
	AWC-1	ACRYLIC WALL COATING	DUROPLEX	LIGHT STOMP /COOL WHITE/BONE WHITE	DS 11	SPRAY APPLICATION
	CMU	CONCRETE MASONRY UNIT	-	-	-	-
	WM	WALL MIRROR	-	CLEAR	-	1/4" PLATE GLASS

FINISH MATERIALS NOTES:

- A. ALL STAINED OAK FINISH SHALL BE CONSISTENT THROUGHOUT. USE ONLY RIFT CUT RED OAK TO MAINTAIN UNIFORM WOOD COLOR AND GRAIN.
- B. GRID COLOR FOR EACH ACOUSTICAL LAY-IN CEILING PANEL SYSTEM SHALL MATCH PANEL COLOR.
- C. PRODUCTS LISTED BY MANUFACTURER ARE FOR IDENTIFICATION AND PERFORMANCE PURPOSES ONLY; THEY ARE NOT INTENDED TO LIMIT SELECTION FROM OTHER MANUFACTURERS. HOWEVER, COLORS, PATTERNS, TEXTURES & PROFILE MUST MATCH THOSE LISTED ABOVE IN ORDER TO MAINTAIN INTERIOR COLOR COORDINATION & DESIGN INTEGRITY.
- D. RAISED RUBBER DOT FLOORING (AS WITH ALL FINISHES) SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

ARCHITECTURAL LIGHT FIXTURE SCHEDULE

REF	TYPE	LOCATION	MFGR	MODEL NO.	DIMENSIONS	MOUNTING	LAMP TYPE	NO. OF LAMPS	FINISH
N	WALL SCONCE	LOBBY	ALS	313	11" W X 8" H X 6 3/4" PROJ	WALL	CFQ13W/4100K	2	BLACK BAKED ENAMEL FINISH
X	PENDANT	CORRIDORS	LIGHTOLIER	LV SERIES	SEE NOTE #2 BELOW	CEILING	F3218/4100K	1	BAKED WHITE SEMI-GLOSS
Z	PENDANT	OFFICE	KITCHLER	K-2655 BK	20" DIA X 8 1/4" BODY HT.	CEILING	150W A21	1	SATIN-ETCHED GLASS W/CLEAR GLASS PLATE & ETCHED CENTER
AA	WALL SCONCE	BRIEF RM	ALS	273	20" WX 5" H X 8" PROJ	WALL	150W A21	1	BLACK BAKED ENAMEL FINISH
BB	RECESS CAN	DISPLAY CASE	LIGHTOLIER	2013BK/1900P1	3 3/4" DIA	CEILING	50W R20	1	BLACK ALZAK REFLECTOR
CC	TRACK LIGHT	BRIEF RM	LIGHTOLIER	6102BK/6254	8" LONG TRACK	CEILING	100W R30	4 (PER TRACK)	BLACK FINISH ON TRACK & SPOTS
EE	STEP LIGHT	BRIEF RM	THOMAS	941-U-9TF-LV	3.25" H X 12" W	STAIR RISER	CFT9W/4100K	1	BLP BLACK POWDER COAT FINISH

NOTES:

1. PRODUCTS LISTED BY MANUFACTURER ARE FOR IDENTIFICATION AND PERFORMANCE PURPOSES ONLY; THEY ARE NOT INTENDED TO LIMIT SELECTION FROM OTHER MANUFACTURERS. HOWEVER, FINISH, STYLE, AND DIMENSIONS MUST MATCH THOSE LISTED ABOVE IN ORDER TO MAINTAIN DESIGN INTEGRITY.
2. INSTALLER SHALL SELECT FROM MANUFACTURER'S STANDARD LENGTH MODELS: LVS14J1 (4'), LVS18J1 (8'), OR LVS112J1 (12') IN COMBINATIONS NECESSARY TO ACHIEVE TOTAL RUNS IN EACH CORRIDOR BAY EQUAL IN LENGTH TO THOSE SHOWN ON ELECTRICAL DRAWING SHTS. E-1 & E-2.
3. SEE ELECTRICAL SHT. E-11 FOR COMPLETE LIST OF LIGHT FIXTURE TYPES AND SPECIFICATIONS.

INTERIOR FINISH LEGEND						
CATEGORY	DESIG.	ITEM	MANUFACTURER	NAME/COLOR	MANUF. NO.	REMARKS
CEILINGS	GW	GYPSUM WALL BOARD	-	-	-	5/8" THICK
	ST-1	SPRAY TEXTURE	US GYPSUM	IMPERIAL QT/PM/WHITE	-	MEDIUM COARSENESS
	ACT-1	ACOUSTICAL CEILING TILE	USG	ACOUSTONE/FROST/MIST	415/053	2" SQ. PANEL; DONN DX GRID/MANILA
	ACT-2	ACOUSTICAL CEILING TILE	USG	ACOUSTONE/FROST/WHITE	415	2" SQ. PANEL; DONN DX GRID/MANILA
	ACT-3	ACOUSTICAL CEILING TILE	USG	AURATONE/ARTISAN 90/MIST	4771/053-A	2" SQ. PANEL; DONN DX GRID/MANILA
	ACT-4	ACOUSTICAL CEILING TILE	USG	CADRE CONCEPTS/MIST	-	2" SQ. PANEL; DONN DX GRID/MANILA
	-	-	-	INSIDE CORNER PANEL	CD176	-
	-	-	-	OUTSIDE CORNER PANEL	CD177	-
	-	-	-	BORDER PANEL	CD175	-
	-	-	-	FIELD PATTERN PANEL	CD178	-
	ACT-5	ACOUSTICAL CEILING TILE	USG	ACOUSTONE CHEX 16/FROST/MIST	416/053	2" SQ. SCORED PANEL; DONN CENTRITEE GRID
	ACT-6	ACOUSTICAL CEILING TILE	USG	ACOUSTONE/GLACIER/MIST	715/053	2" SQ. PANEL; DONN DX GRID/MANILA
DOOR FRAMES	DRFR	HOLLOW METAL DOOR FRAME	-	PAINT - PT-6	-	-
	HM	HOLLOW METAL	-	PAINT - PT-6	-	-
DOORS	WD	WOOD-SOLID CORE	-	-	-	-
	TP-2	SOLID PHENOLIC PARTITION	BOBRICK	DURALINE/FEATHERSTONE	1081/930	FLOOR ANCHORED/POLISHED BLACK EDGES
TOILET PARTITIONS	TP-1	SOLID PHENOLIC PARTITION	BOBRICK	DURALINE/WHITE NEBULA	1081/929	FLOOR ANCHORED/POLISHED BLACK EDGES
	FTG-1	FLOOR TILE GROUT	MAPEI	KERACOLOR/GRAY	9	3/8" SANDED GROUT JOINT W/ LATEX ADDITIVE
OTHER	WTG-1	WALL TILE GROUT	MAPEI	KERACOLOR/WHITE	0	1/8" UNSANDED GROUT JOINT W/LATEX ADDITIVE
	AT-1	ACCENT TRIM	CONSTRUCTION SPECIALTIES	ACROVYN/BLACK	FR-125/108	1 1/8" BULLNOSE
	CG-1	CORNER GUARD	CONSTRUCTION SPECIALTIES	ACROVYN/BLACK	TF-200/108	2" WIDE; PEBBLETTE FINISH
	CR-1	CHAIR RAIL	CONSTRUCTION SPECIALTIES	NATURAL OAK/BLACK VINYL	BCRW-40	4" H; BULLNOSE VINYL INSERT
	VE-1	VINYL T-MOLD EDGING	-	BLACK	-	1 3/4" PROFILE; OFFSET STYLE
	VS-1	VINYL/ACRYLIC SHEETING	CONSTRUCTION SPECIALTIES	ACROVYN/SLATE	209	.022" THICK
	VS-2	VINYL/ACRYLIC SHEETING	CONSTRUCTION SPECIALTIES	ACROVYN/BLACK	108	.040" THICK
	DEP-1	DOOR ENVELOPE PROTECTOR	CONSTRUCTION SPECIALTIES	ACROVYN/BLACK	DP3632/108	.040" THICK; PEBBLETTE FINISH
	DFP-1	DOOR FRAME PROTECTOR	CONSTRUCTION SPECIALTIES	ACROVYN/BLACK	B-1/108	.040" THICK; PEBBLETTE FINISH
	EM-1	SURFACE MOUNTED FLOOR MAT	CONSTRUCTION SPECIALTIES	PEDIMAT II/GRAPHITE	PMH400/SM/9325	SURFACE MOUNT W/BLACK VINYL EDGE
	SS-1	STAINLESS STEEL SHEET	-	BRUSHED FINISH	-	16 GAUGE
	SS-2	STAINLESS STEEL SHEET	-	BRUSHED FINISH	-	20 GAUGE
	RTS-1	RUBBER TRANSITION STRIP	ROPPE	DARK GRAY	26/150	3/8" BUTTING GAUGE
	RTS-2	RUBBER TRANSITION STRIP	ROPPE	DARK GRAY	20/150	1/8" BUTTING GAUGE
	VTS-1	VINYL TRANSITION STRIP	ROPPE	DARK GRAY	156/150	3/8" BUTTING GAUGE UNDERCUT
	VTS-2	VINYL TRANSITION STRIP	ROPPE	DARK GRAY	168/150	UNDERSLUNG REDUCER
	VTS-3	VINYL TRANSITION STRIP	ROPPE	DARK GRAY	177/150	VINYL TILE CARPET JOINER
	WB	WINDOW BLINDS	HUNTER DOUGLAS	SILVER CLOUD	318	1" WIDE SLAT; INSIDE MOUNT

FURNITURE & EQUIPMENT COLOR/FINISH KEY

ITEM NO.	DESCRIPTION	MANUFACTURER	COLOR/FINISH
G	FIXED UPHOLSTERED AUDITORIUM SEATING W/TABLET ARM	IRWIN SEATING COMPANY "CITATION" MODEL NO. 4686TA	PLASTIC SEAT BACK, SEAT BOTTOM & ARMS: BLACK. STEEL FRAME EPOXY PAINT COLOR: BLACK. PLASTIC LAMINATE FOR TABLET ARM: BLACK. SEAT & CHAIR BACK UPHOLSTERY: SHERDA COLOR EMPRESS PER MOD. P00002
W	PRE-WIRED WORKSTATIONS	KNOLL "EQUITY"	PANEL FABRIC: MELBOURNE #228/15 OATMEAL. PAINTED METAL FINISH COLOR (PANEL TRIM, PEDESTALS, FILE CABINETS): TAUPE. WORK SURFACE LAMINATE: M96 ROSE GRANITE. FLIPPER DOOR FINISH: LAMINATE: M80 TAUPE. UPHOLSTERY: MELBOURNE #228/15 OATMEAL (WORKSTATIONS 05, 24, 25, 27, 29, 36, 37, & 39 ONLY)
72	WORKSTATION SEATING	KNOLL "BULLDOG" EXECUTIVE TWO-PIECE	BASE, ARM & CHAIR BACK FINISH: BLACK. UPHOLSTERY: KNOLL POSEIDON K620/6 BURGUNDY
73	WORKSTATION SEATING	KNOLL "BULLDOG" MANAGEMENT TWO-PIECE	BASE, ARM & CHAIR BACK FINISH: BLACK. UPHOLSTERY: KNOLL POSEIDON K620/6 BURGUNDY
74	WORKSTATION SEATING	KNOLL "BULLDOG" PROFESSIONAL ONE-PIECE	BASE, ARM & CHAIR BACK FINISH: BLACK. UPHOLSTERY: KNOLL ENCORE K350/2 ROSE TWEED
75	WORKSTATION SEATING	KNOLL "BULLDOG" PROFESSIONAL ONE-PIECE ARMLESS	BASE, ARM & CHAIR BACK FINISH: BLACK. UPHOLSTERY: KNOLL ROCHELLE K721/1 MERLOT

WINDOW BLIND NOTES:

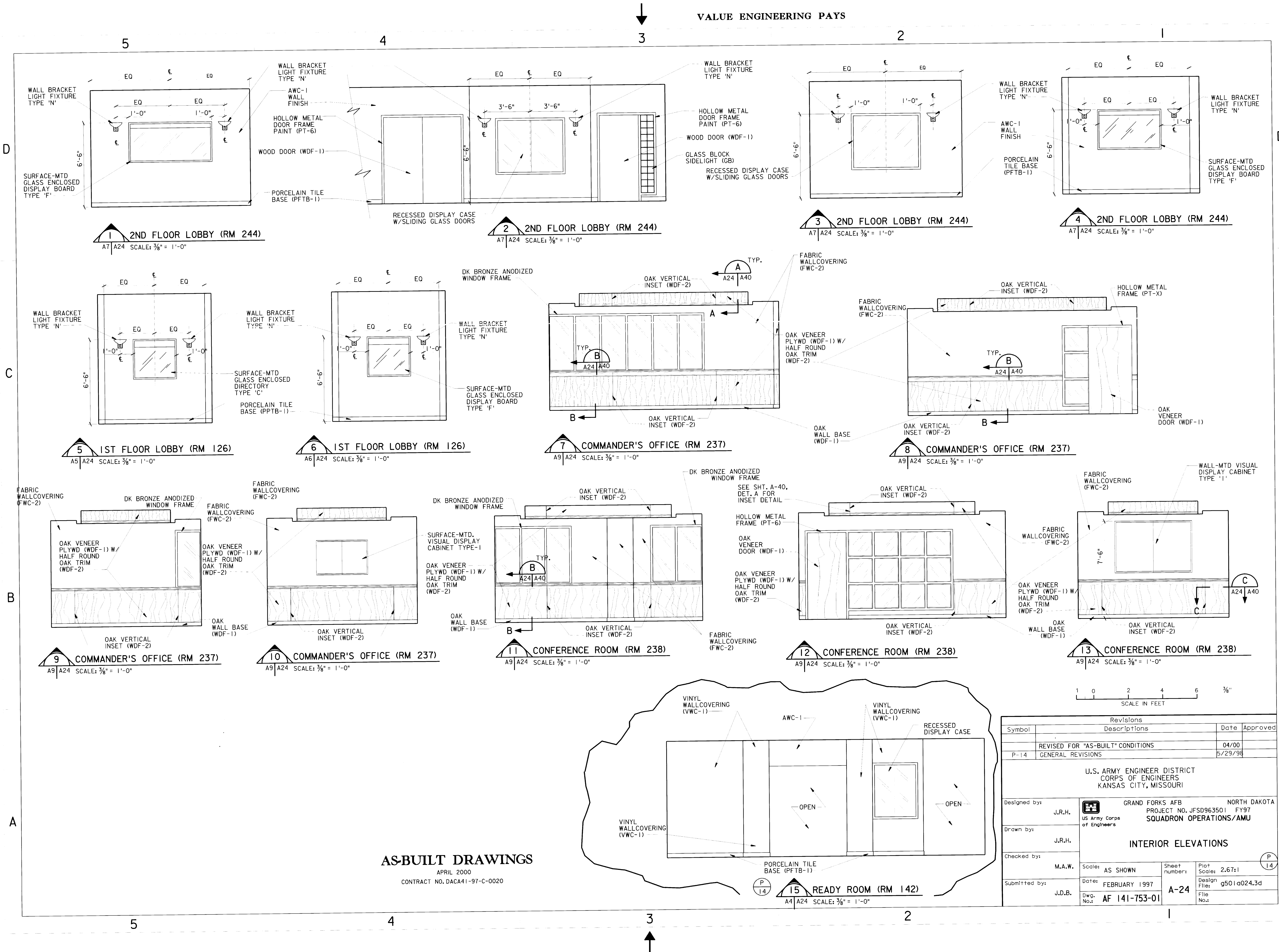
- A. WINDOW BLINDS SHALL BE LOCATED AT ALL EXTERIOR AND INTERIOR WINDOWS WITH THE EXCEPTION OF INTERIOR SLIDING WINDOWS, GLASS BLOCK WINDOWS, AND TESTING ROOM (RM 207) INTERIOR WINDOWS.
- B. ALL BLINDS SHALL BE AN INSIDE MOUNT (WITHIN THE WINDOW FRAME) INSTALLATION.
- C. WINDOW BLINDS SHALL BE INSTALLED ON THE ROOM SIDE OF INDIVIDUAL OFFICE INTERIOR WINDOWS RATHER THAN CORRIDOR OR COMMON ROOM SIDE.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	5/29/98	
		04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	J.R.H.	INTERIOR FINISH MATERIALS LEGENDS	
Checked by:	S.L.H.	Scale: AS SHOWN	Sheet number: A-23
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Design File: g501a023.3d
		Dwg. No.: AF 141-753-01	Plot Scale: 8:1

VALUE ENGINEERING PAYS

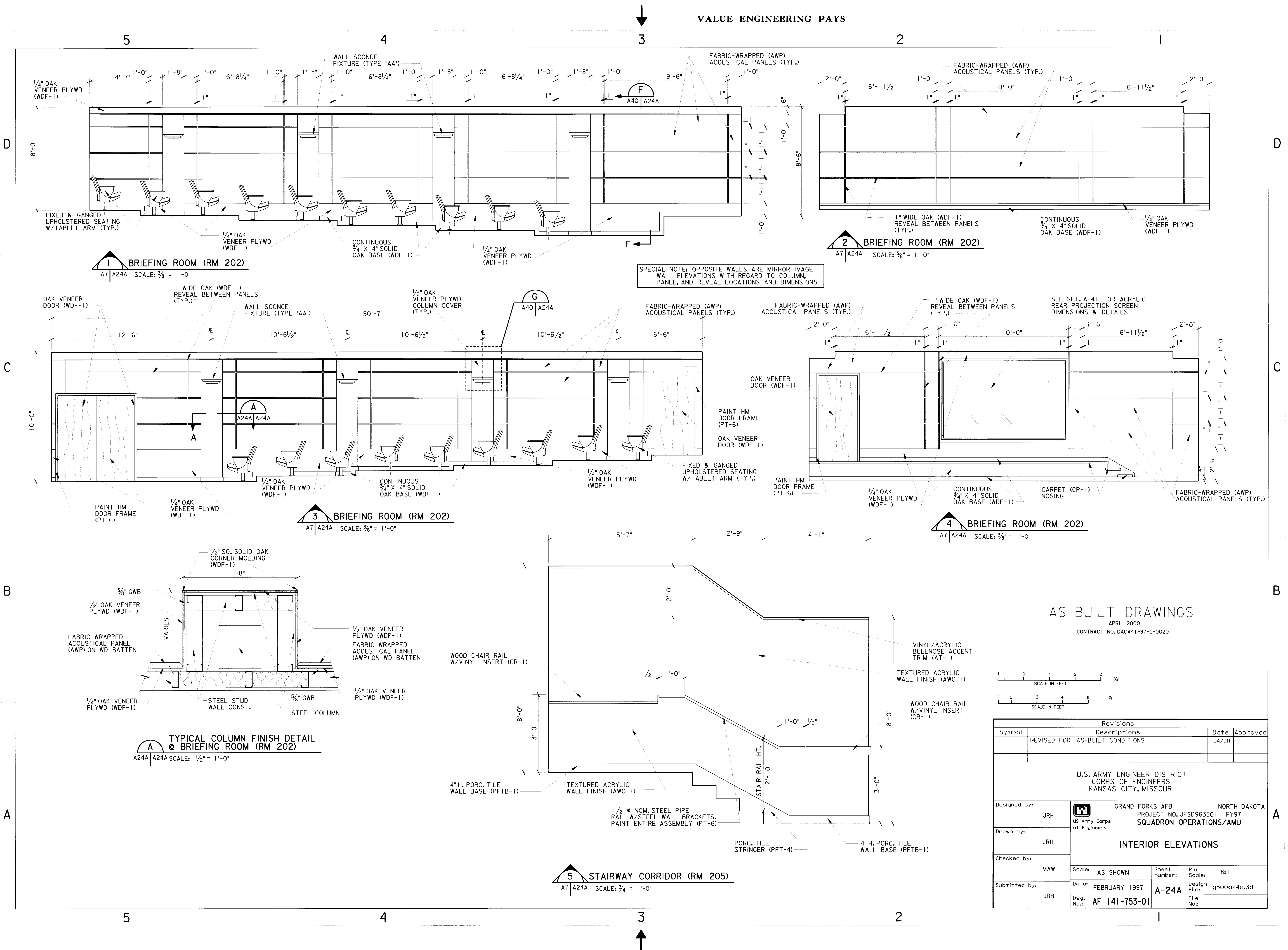


AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

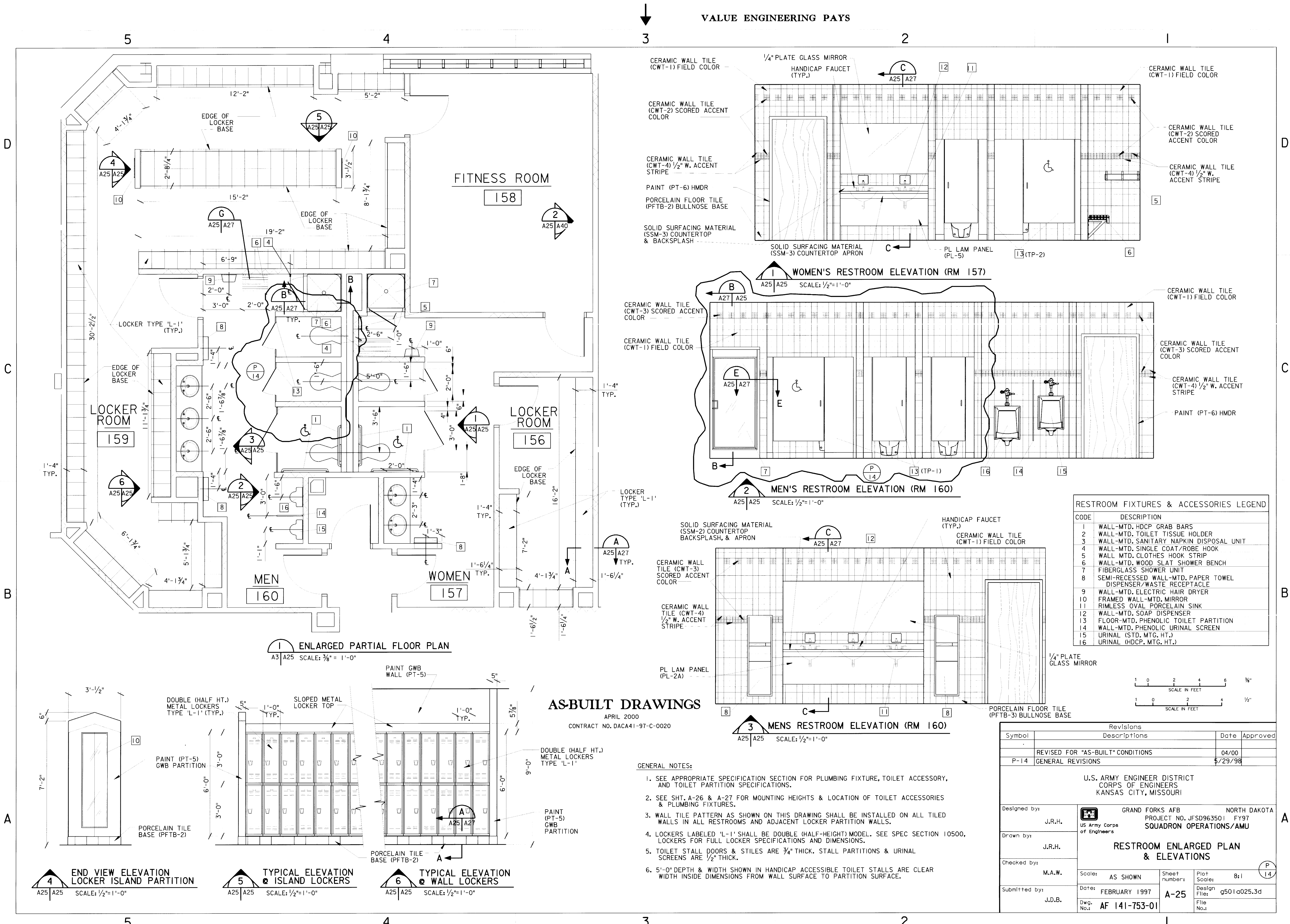
Revisions			
Symbol	Descriptions	Date	Approved
P-14	REVISD FOR "AS-BUILT" CONDITIONS	04/00	
	GENERAL REVISIONS	5/29/98	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.		
Checked by:	M.A.W.	Scale: AS SHOWN	Sheet number: Plot Scale: 2.67:1
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Design File: g501a024.3d
		Dwg. No.: AF 141-753-01	File No.:

631-00-156-58 A-24

VALUE ENGINEERING PAYS



631-000-156-59 A-24A



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

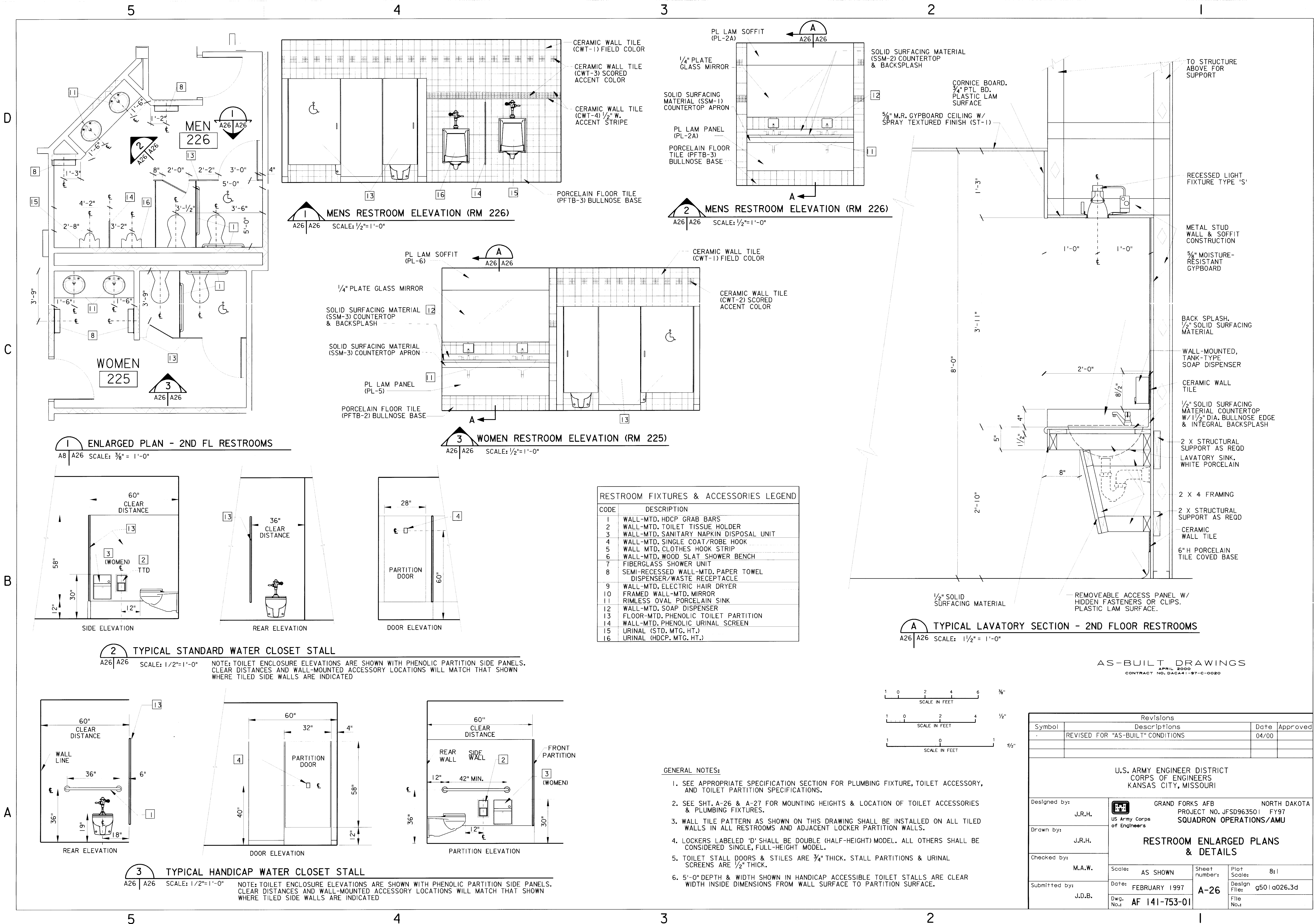
GENERAL NOTES:

- SEE APPROPRIATE SPECIFICATION SECTION FOR PLUMBING FIXTURE, TOILET ACCESSORY, AND TOILET PARTITION SPECIFICATIONS.
- SEE SHT. A-26 & A-27 FOR MOUNTING HEIGHTS & LOCATION OF TOILET ACCESSORIES & PLUMBING FIXTURES.
- WALL TILE PATTERN AS SHOWN ON THIS DRAWING SHALL BE INSTALLED ON ALL TILED WALLS IN ALL RESTROOMS AND ADJACENT LOCKER PARTITION WALLS.
- LOCKERS LABELED 'L-1' SHALL BE DOUBLE (HALF-HEIGHT) MODEL. SEE SPEC SECTION 10500, LOCKERS FOR FULL LOCKER SPECIFICATIONS AND DIMENSIONS.
- TOILET STALL DOORS & STILES ARE 3/4" THICK. STALL PARTITIONS & URINAL SCREENS ARE 1/2" THICK.
- 5'-0" DEPTH & WIDTH SHOWN IN HANDICAP ACCESSIBLE TOILET STALLS ARE CLEAR WIDTH INSIDE DIMENSIONS FROM WALL SURFACE TO PARTITION SURFACE.

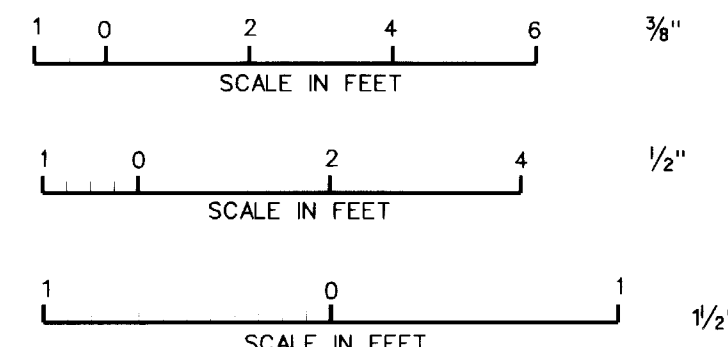
CODE	DESCRIPTION
1	WALL-MTD. HDPC GRAB BARS
2	WALL-MTD. TOILET TISSUE HOLDER
3	WALL-MTD. SANITARY NAPKIN DISPOSAL UNIT
4	WALL-MTD. SINGLE COAT/ROBE HOOK
5	WALL MTD. CLOTHES HOOK STRIP
6	WALL-MTD. WOOD SLAT SHOWER BENCH
7	FIBERGLASS SHOWER UNIT
8	SEMI-RECESSED WALL-MTD. PAPER TOWEL DISPENSER/WASTE RECEPTACLE
9	WALL-MTD. ELECTRIC HAIR DRYER
10	FRAMED WALL-MTD. MIRROR
11	RIMLESS OVAL PORCELAIN SINK
12	WALL-MTD. SOAP DISPENSER
13	FLOOR-MTD. PHENOLIC TOILET PARTITION
14	WALL-MTD. PHENOLIC URINAL SCREEN
15	URINAL (STD. MTG. HT.)
16	URINAL (HDPC. MTG. HT.)

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
P-14	GENERAL REVISIONS	5/29/98	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	J.R.H.	Grand Forks AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.	RESTROOM ENLARGED PLAN & ELEVATIONS	
Checked by:	M.A.W.	Scale: AS SHOWN	Sheet number: 8 of 1
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Design File: g501a025.3d
	Dwg. No.: AF 141-753-01		File No.:

631-00- 156-60 A-25

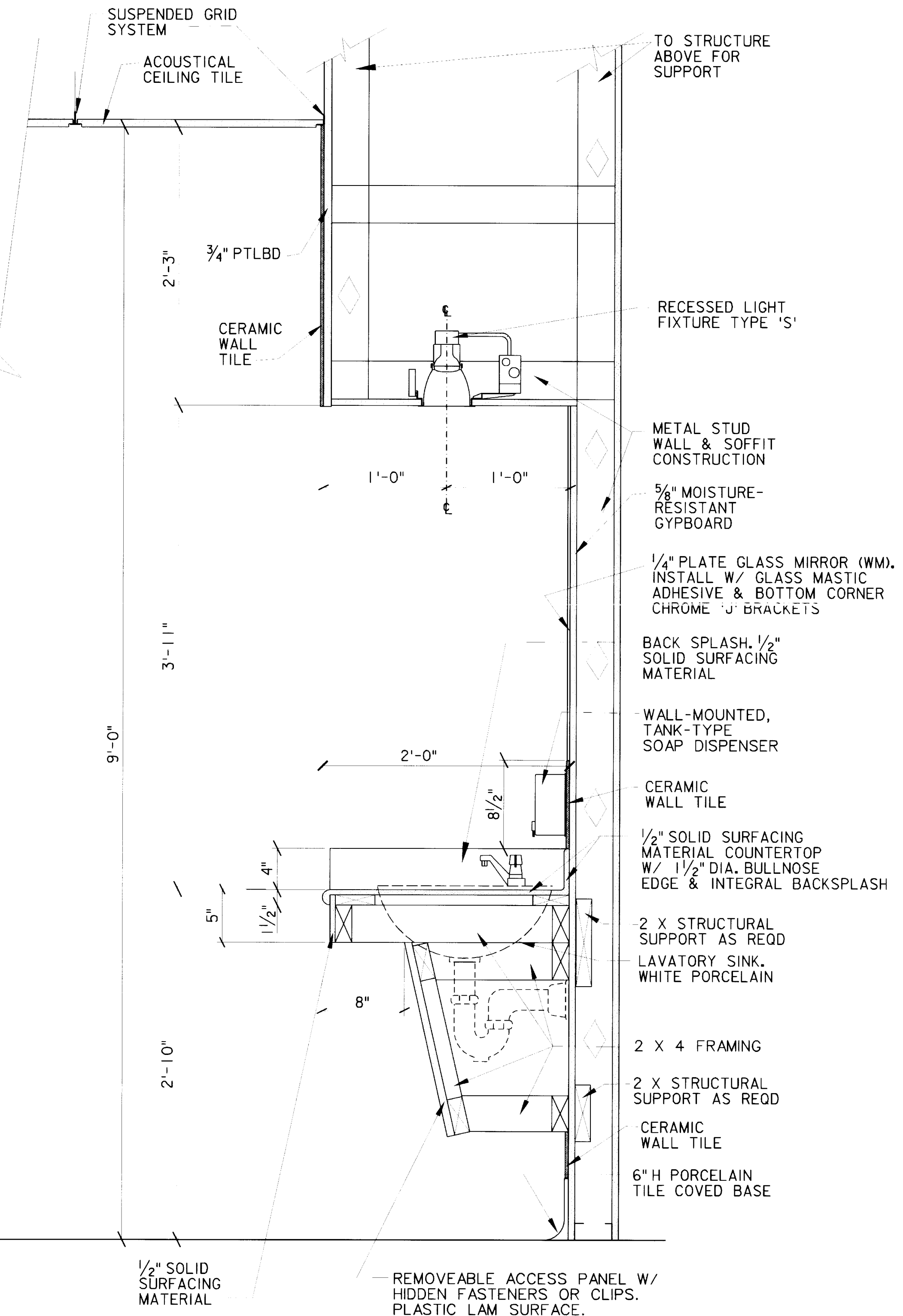


AS-BUILT DRAWINGS
 APRIL 2000
 CONTRACT NO. DACA41-97-C-0020

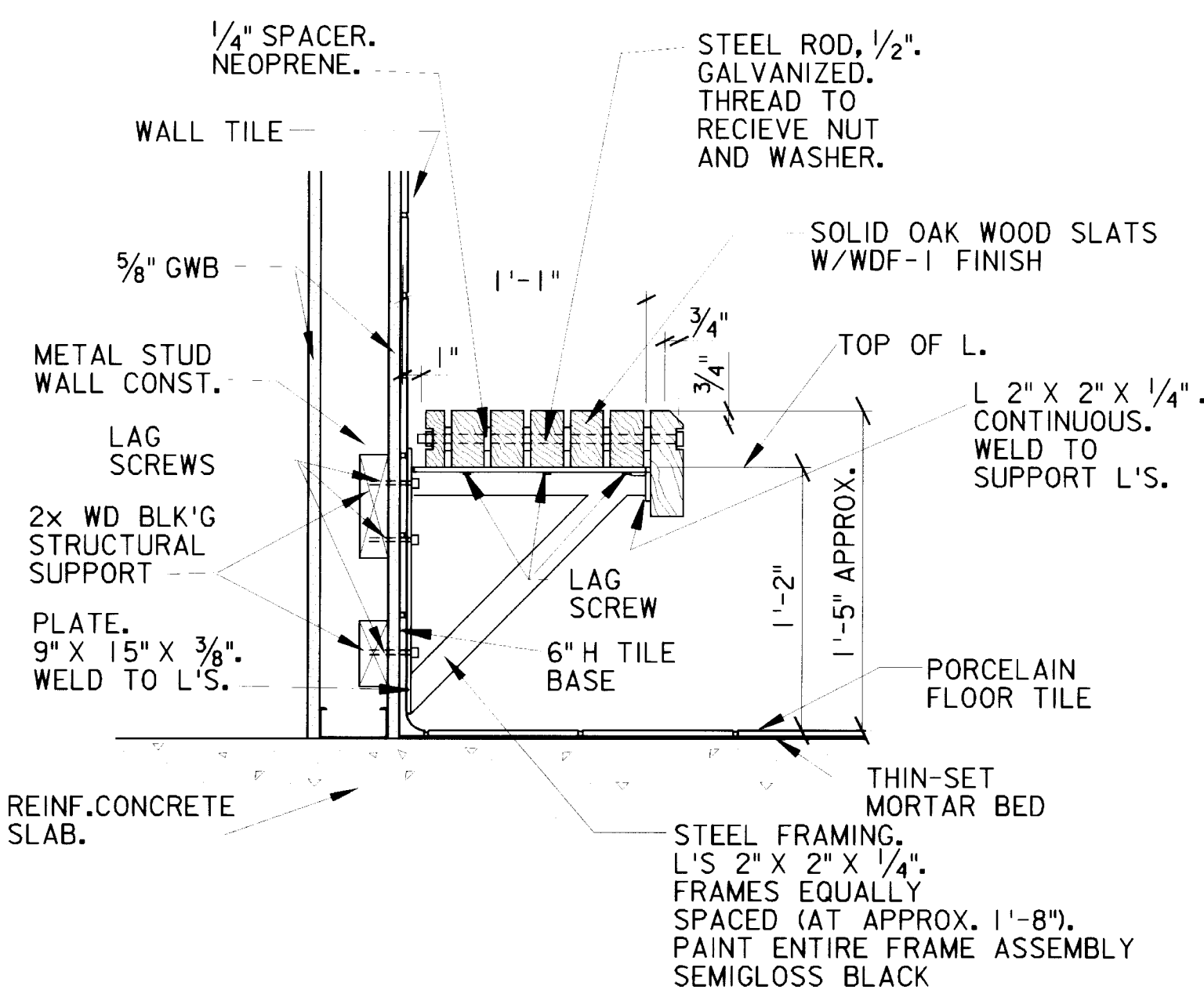


Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	Grand Forks AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.	RESTROOM ENLARGED PLANS & DETAILS	
Checked by:	M.A.W.		
Submitted by:	J.D.B.	Scale: AS SHOWN	Sheet number: 8:1
		Date: FEBRUARY 1997	Design File: g501a026.3d
		Dwg. No.: AF 141-753-01	File No.:

631-000-156-61 A-26




C TYPICAL LAVATORY SECTION - 1ST FLOOR RESTROOMS
A25 | A27 SCALE: 1 1/2" = 1'-0"



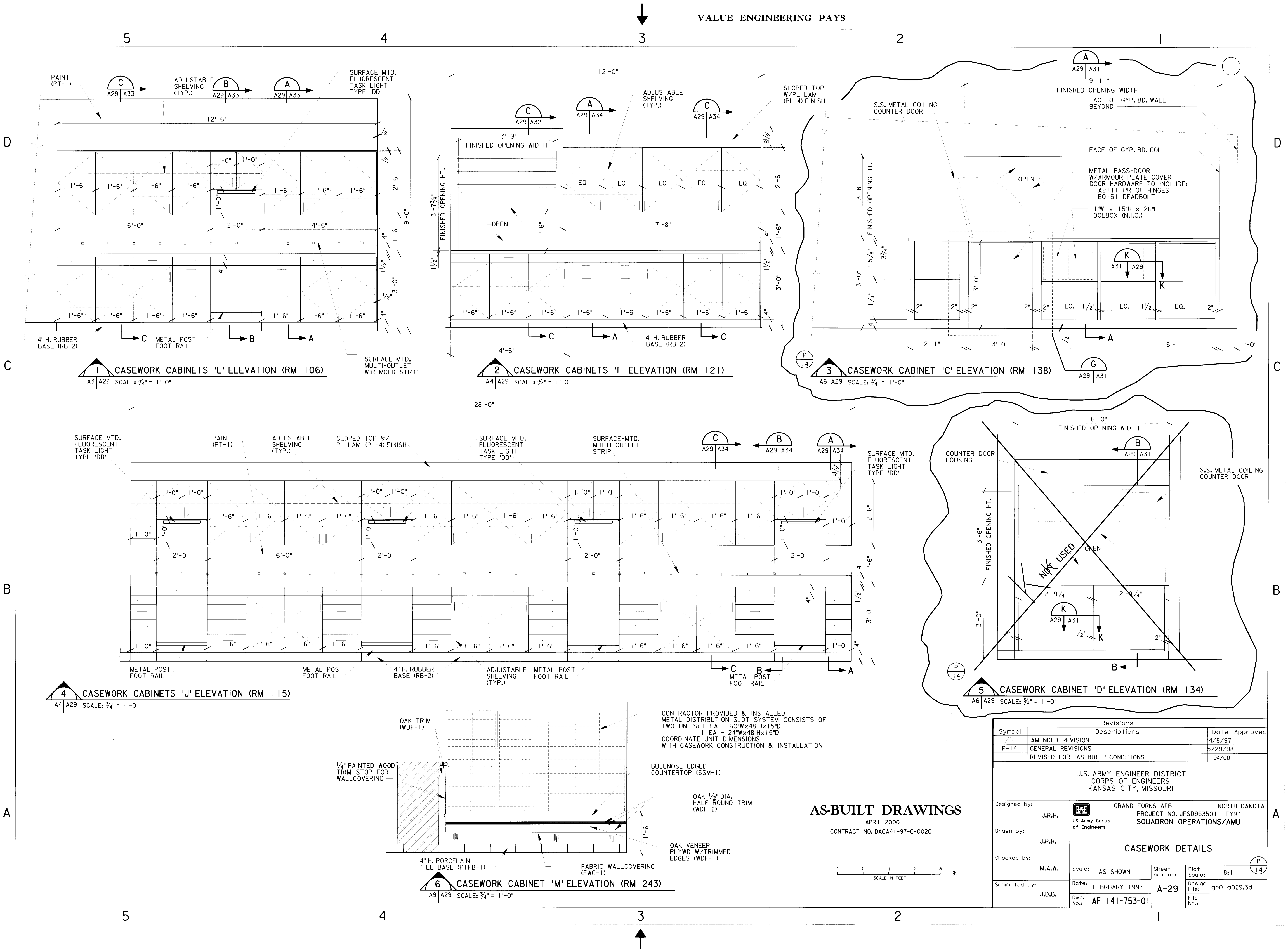
SECTION THRU WALL-MTD BENCH
 @ RESTROOM SHOWER

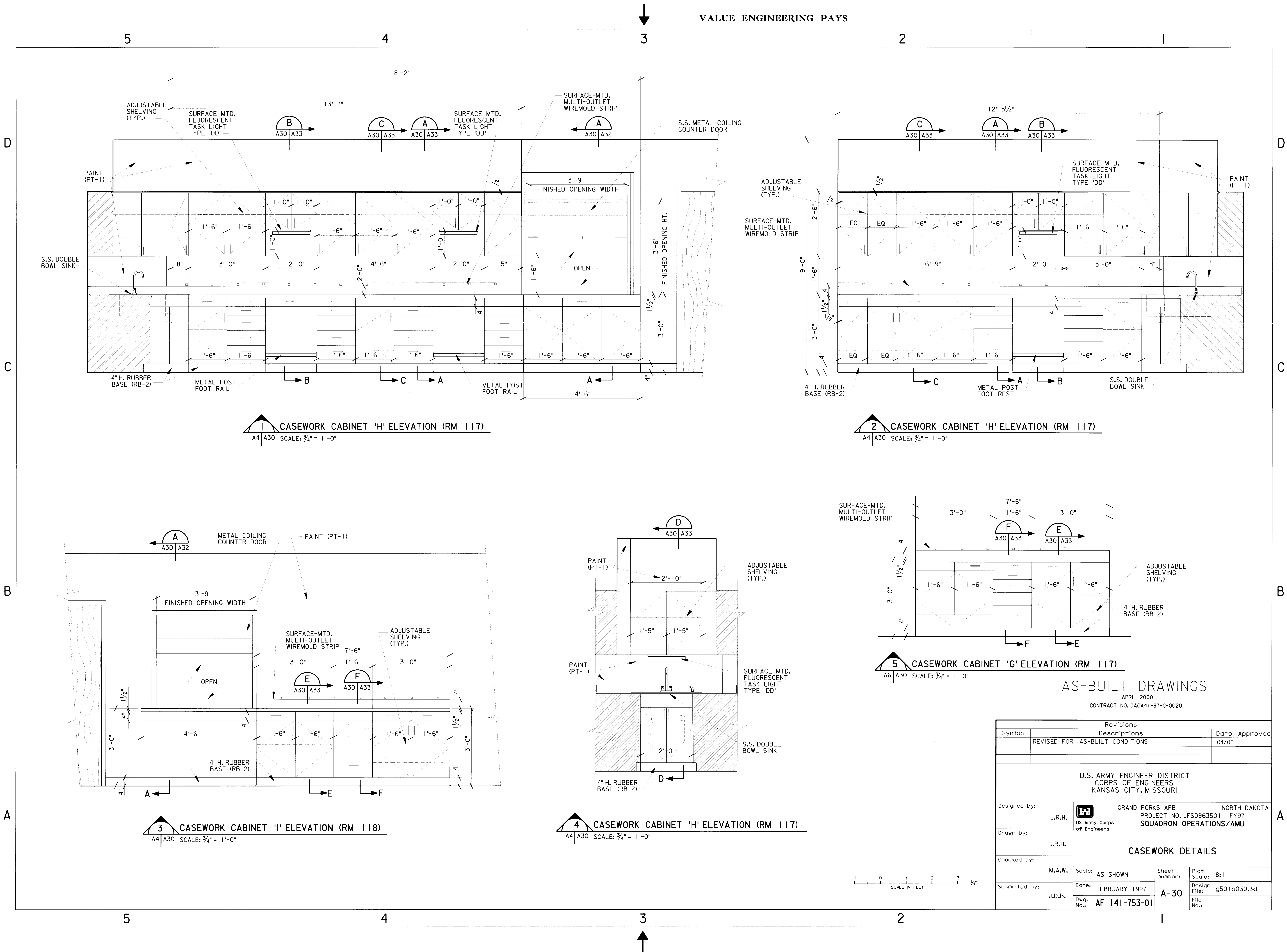
A25 A27 SCALE: $1\frac{1}{2}" = 1'-0"$

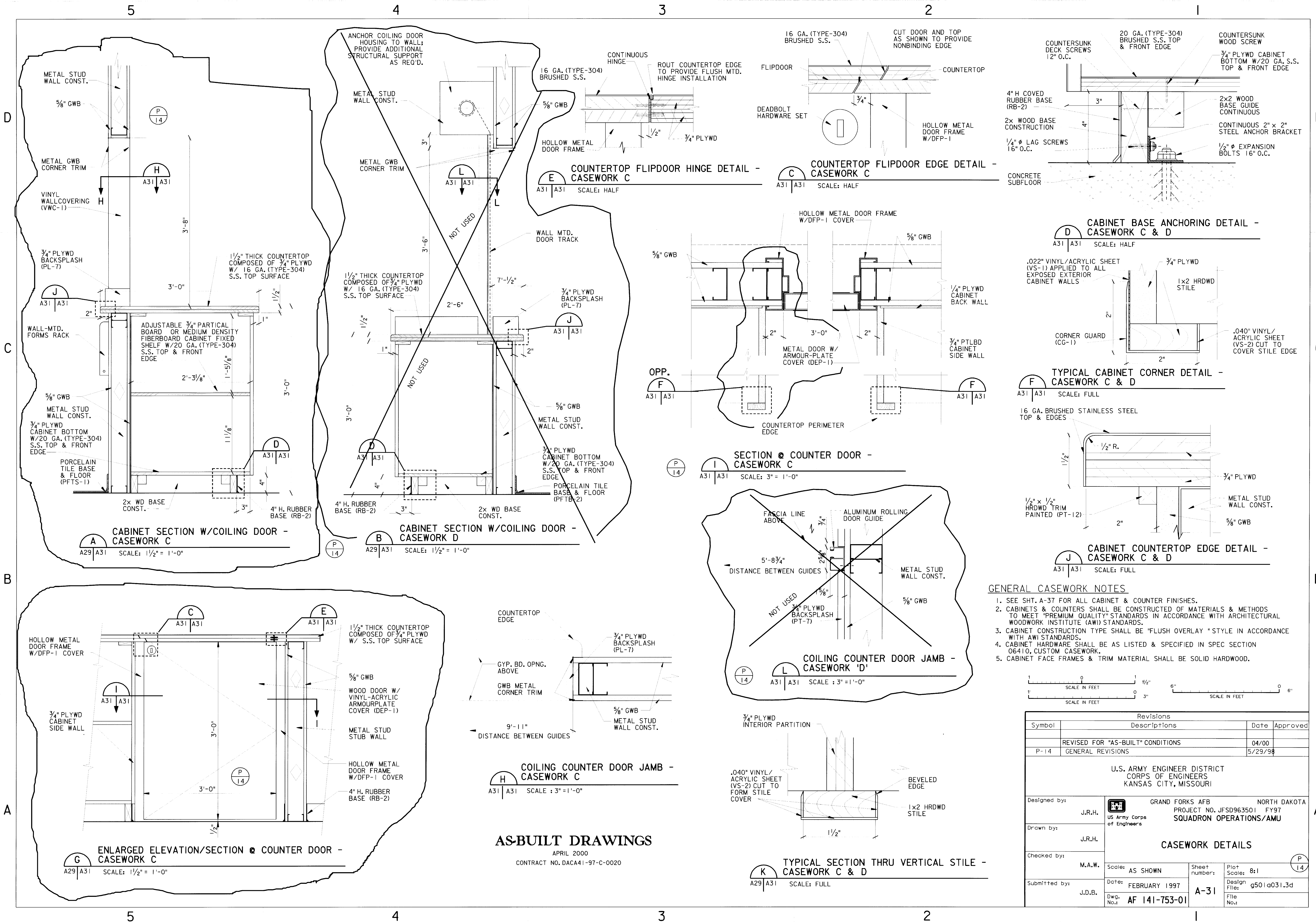
Revisions			
Symbol	Descriptions		Date
	REVISED FOR "AS-BUILT" CONDITIONS		04/00
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	 GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU RESTROOM DETAILS		
J.R.H.			
Drawn by:			
J.R.H.			
Checked by:			
M.A.W.	Scale: AS SHOWN	Sheet number: A-27	Plot Scale: 8:1
Submitted by:	Date: FEBRUARY 1997	Design File: g501a027.3d	
J.D.B.	Dwg. No. AF 141-753-01	File No.	



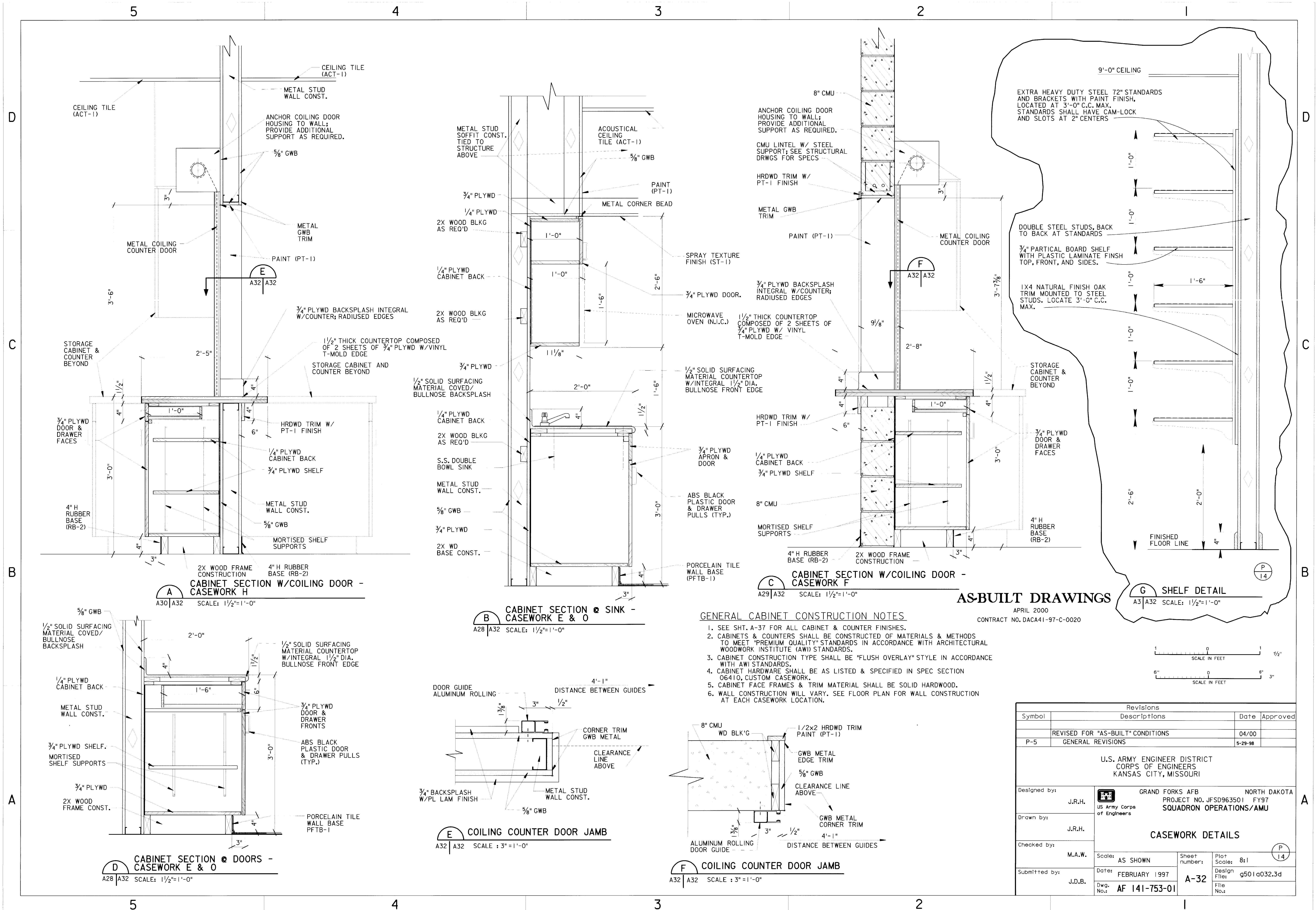
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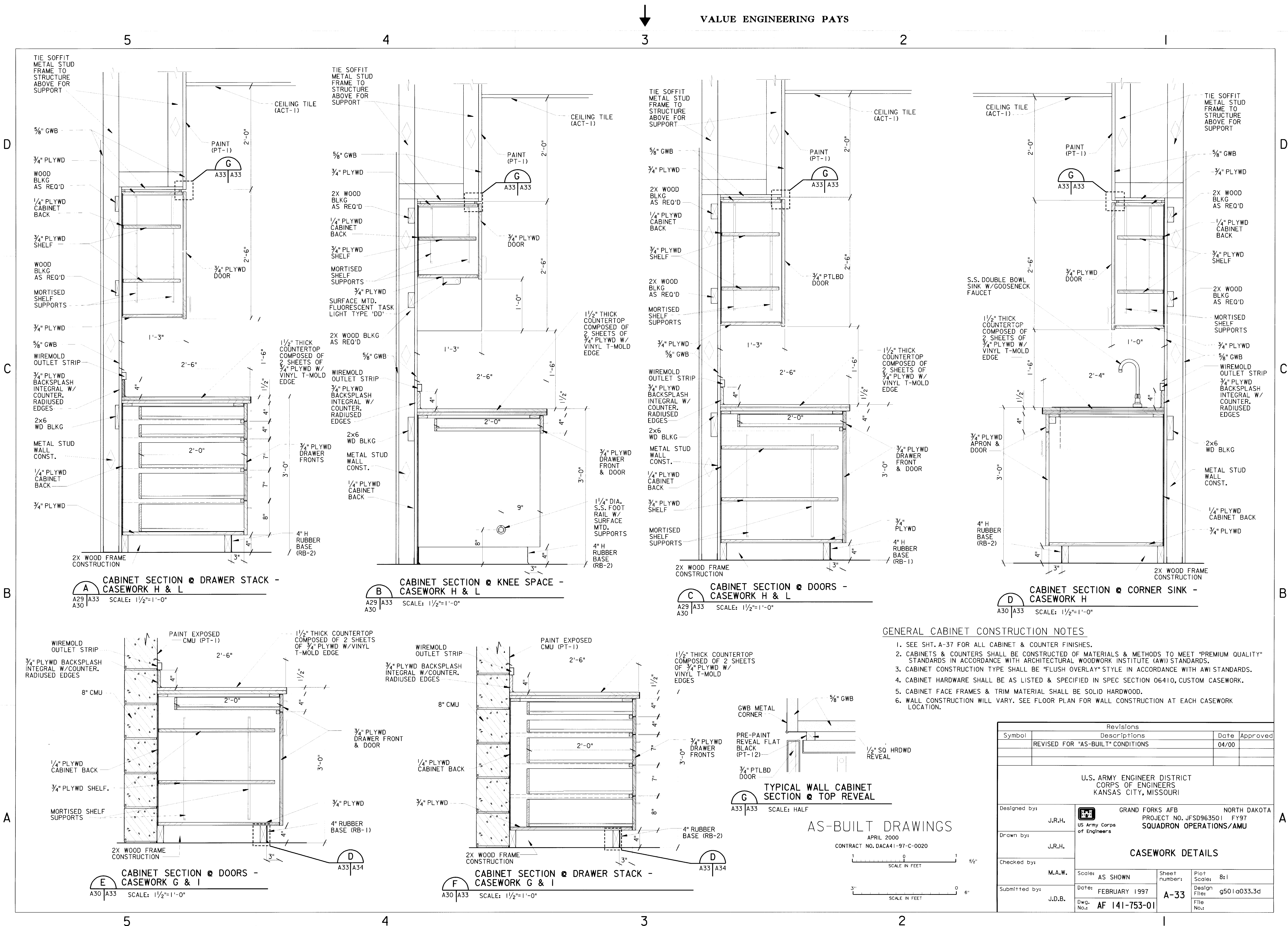




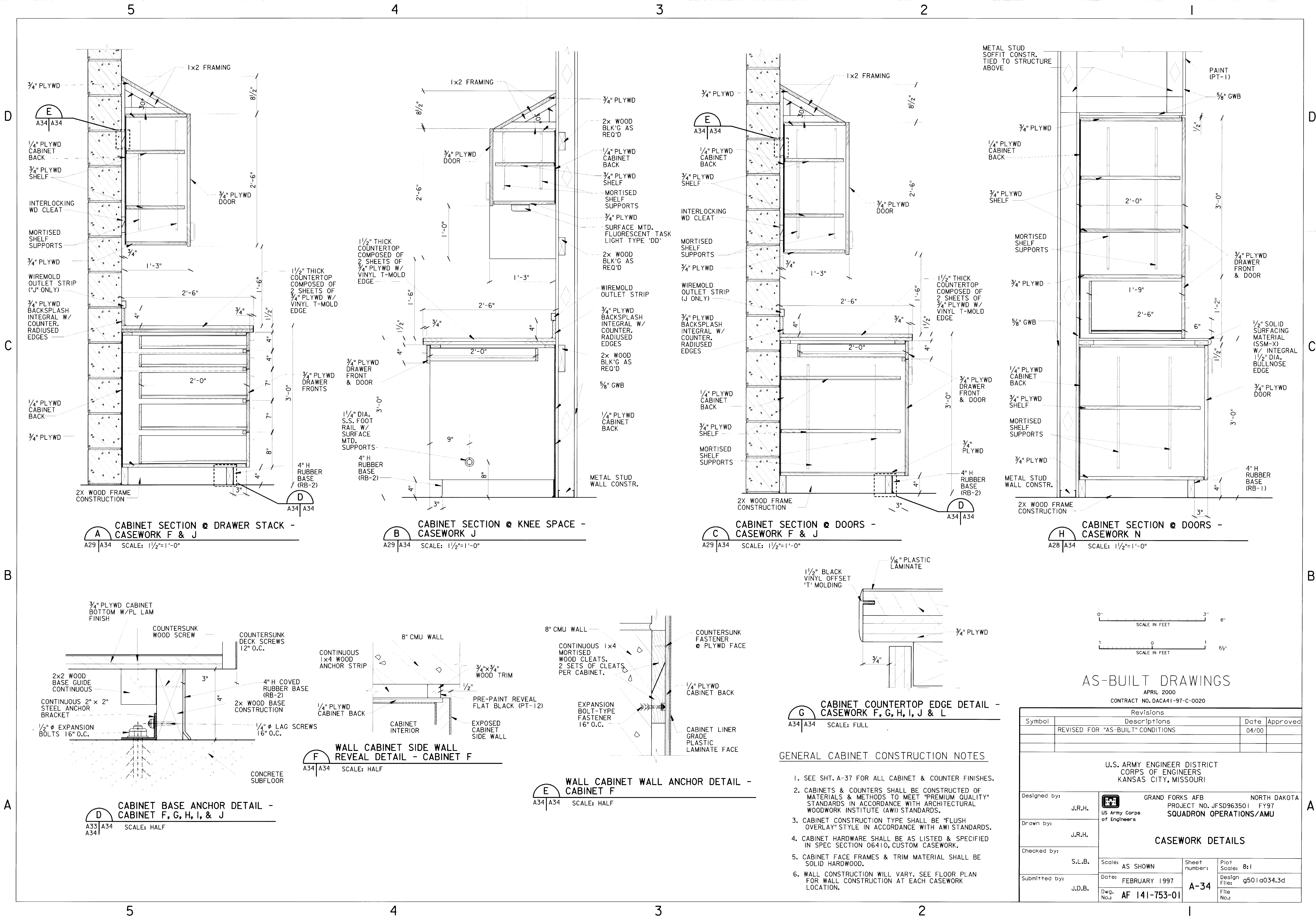


631-000-156-66 A-31





631-000-156-68 A-33

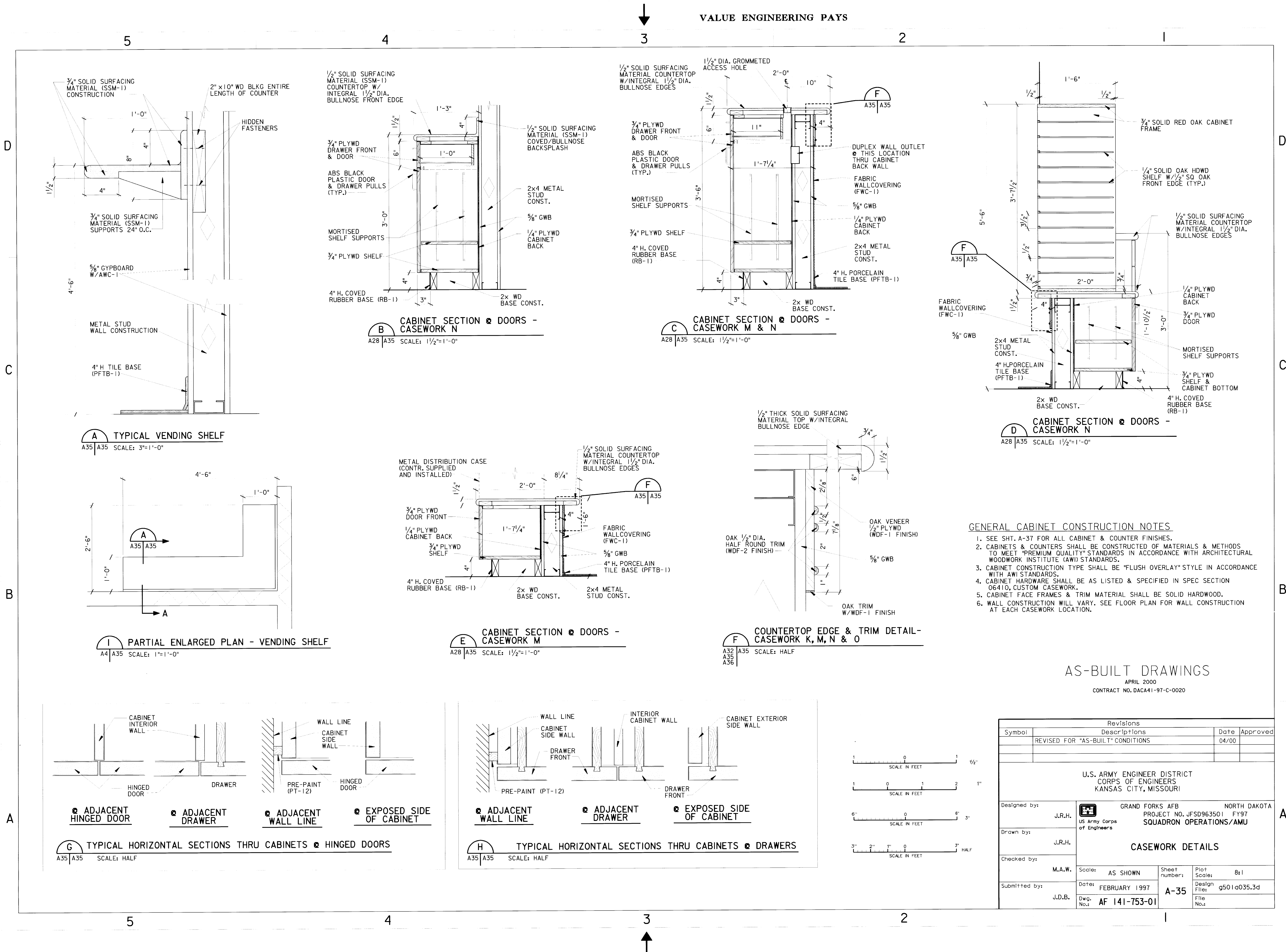


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions		
Symbol	Descriptions	Date Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p> <p>Designed by: J.R.H. GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU</p> <p>Drawn by: J.R.H.</p> <p>Checked by: S.L.B.</p> <p>Submitted by: J.D.B.</p>		
<p>CASEWORK DETAILS</p> <p>Scale: AS SHOWN Sheet number: Plot Scale: 8:1</p> <p>Date: FEBRUARY 1997 Desgn File: g501a034.3d</p> <p>Dwg. No.: AF 141-753-01 File No.:</p>		

631-000-156-69 A-34



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020


Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p> <p>DESIGNED BY: J.R.H. GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU</p> <p>CHECKED BY: M.A.W. SCALES: AS SHOWN SHEET NUMBER: A-35 PLOT SCALE: 8:1</p> <p>SUBMITTED BY: J.D.B. DATE: FEBRUARY 1997 DESIGN FILE: g501a035.3d</p> <p>DWG. NO.: AF 141-753-01 FILE NO.:</p>			

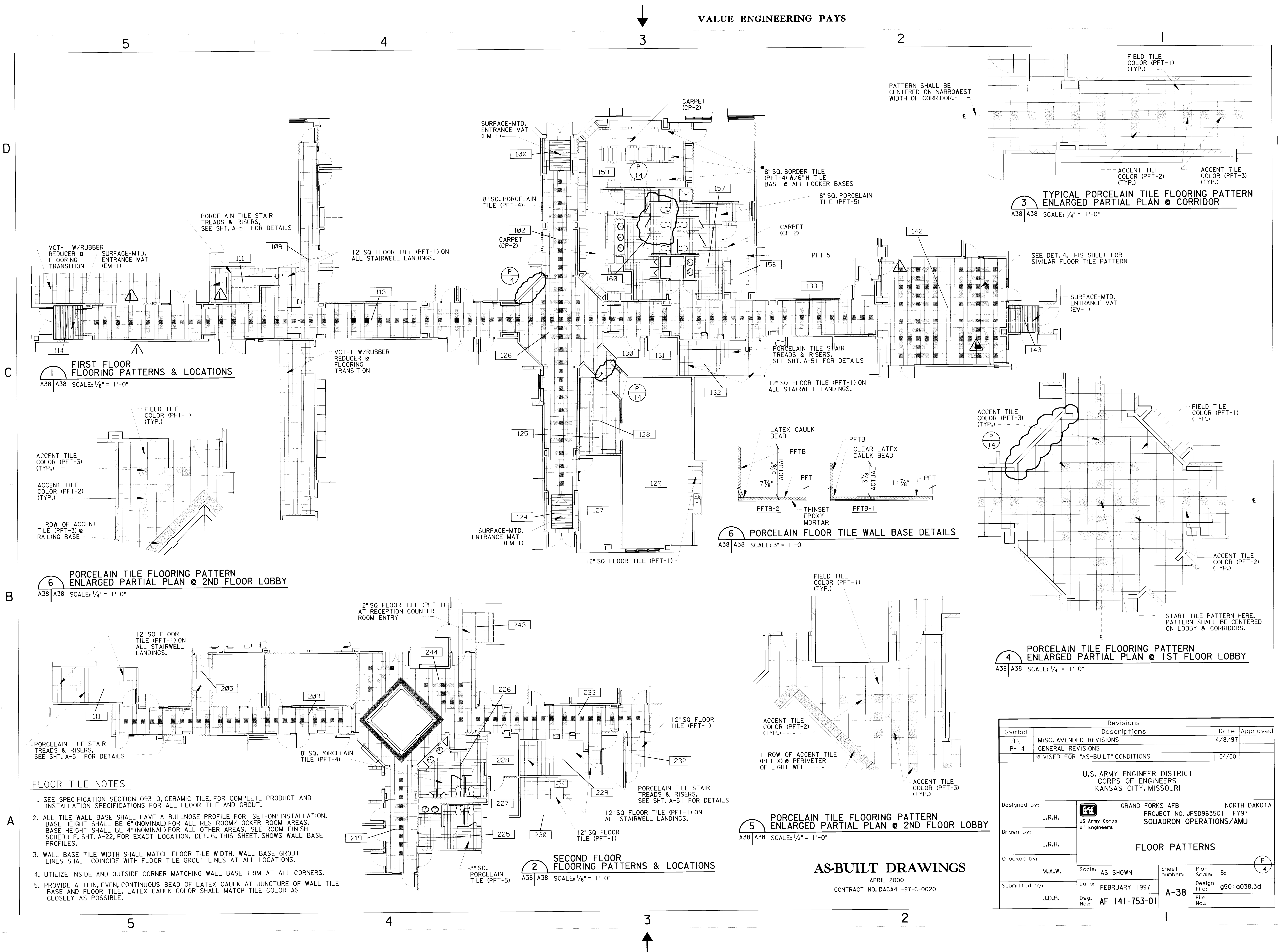
631-00- 156-70 A-35

A technical line drawing of a kitchen sink assembly. The drawing shows a side profile of the sink unit. Callout 1 points to the top edge of the sink basin. Callout 2 points to the front edge of the sink unit. Callout 3 points to the side edge of the sink unit. Callout 4 points to the front edge of the base cabinet. Callout 5 points to a faucet assembly mounted on the sink. Dashed lines indicate the internal structure and the connection between the sink and the base cabinet.

[illegible]

631-000- 156-71 A-37

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
P-14	GENRAL REVISIONS	5/29/98	
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAU CITY, MISSOURI</p>			
Designed by:	 GRAND FORKS AFB NORTH DAKOTA US Army Corps of Engineers PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU		
JRH			
Drawn by:			
JRH			
Checked by:	CASEWORK DETAILS		
SLH	Scale: AS SHOWN	Sheet number:	Plot Scale: 8:1
Submitted by:	Date: FEBRUARY 1997	A-37	Design File: g501a037.3d
JDB	Dwg. No. AF 141-753-01		File No.

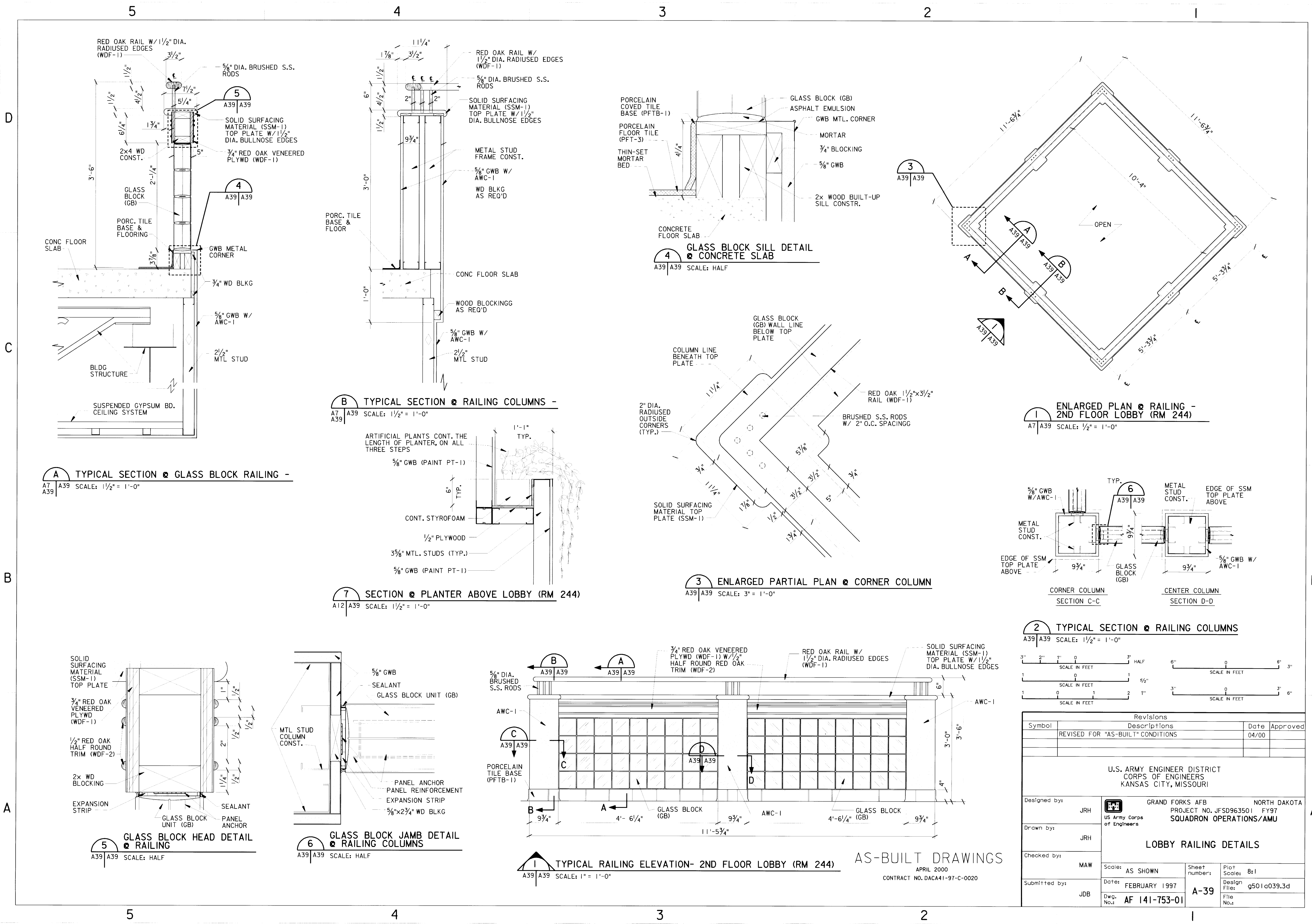


Revisions			
Symbol	Descriptions	Date	Approved
1	MISC. AMENDED REVISIONS	4/8/97	
P-14	GENERAL REVISIONS		
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	US Army Corps of Engineers	
Drawn by:	J.R.H.		
Checked by:	M.A.W.		
Submitted by:	J.D.B.		
Scale:	AS SHOWN	Sheet number:	P 14
Date:	FEBRUARY 1997	Plot Scale:	8:1
Dwg. No.:	AF 141-753-01	Design File:	q501a038.3d
		File No.:	

631-000- 156-72 A-38

ASBUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JRH	Grand Forks AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JRH	LOBBY RAILING DETAILS	
Checked by:	MAW	Scale: AS SHOWN	Sheet number: A-39
Submitted by:	JDB	Date: FEBRUARY 1997	Plot Scale: 8:1
		Dwg. No.: AF 141-753-01	Design File: g501 a039.3d
			File No.:

631-000 156-73 A-39

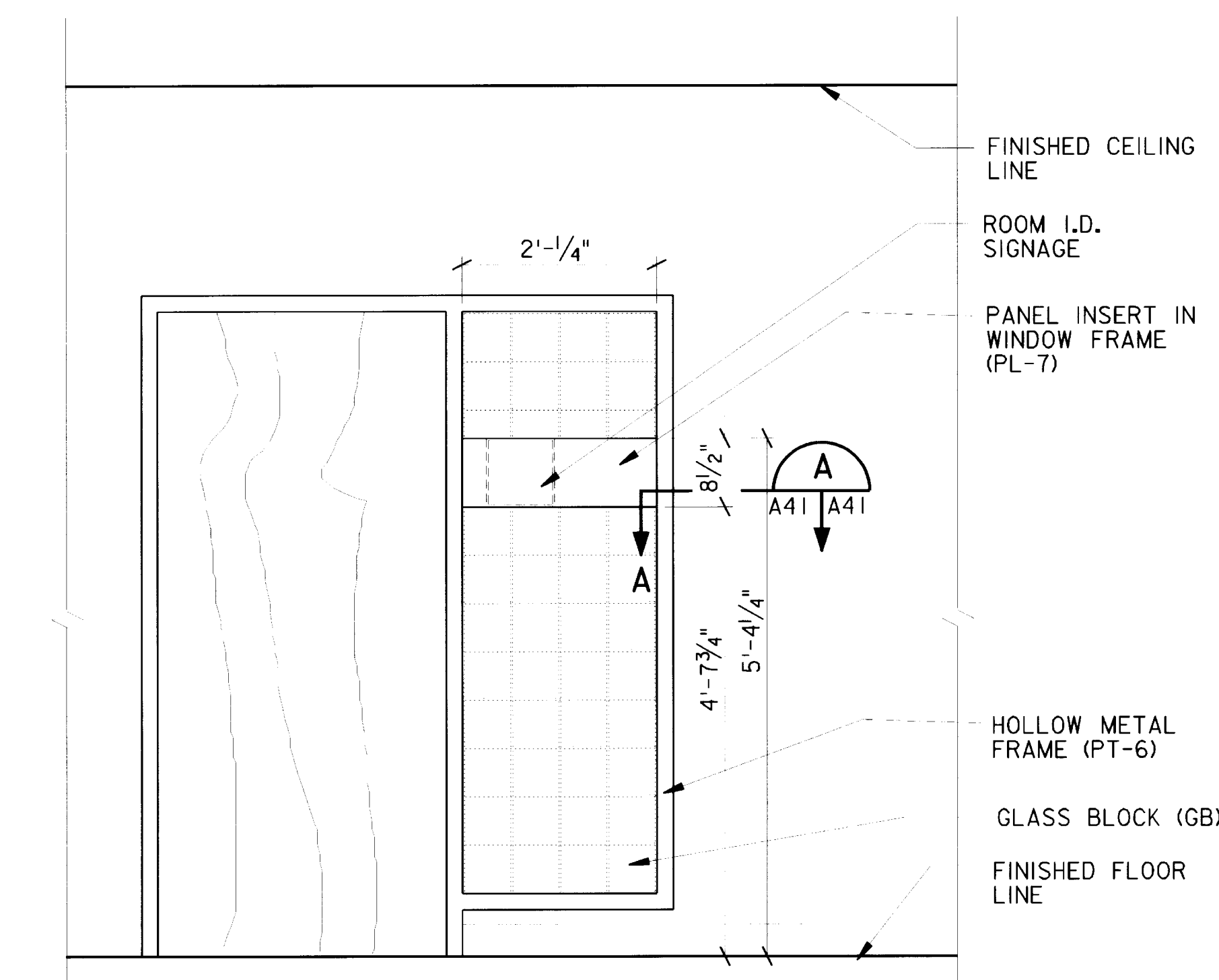


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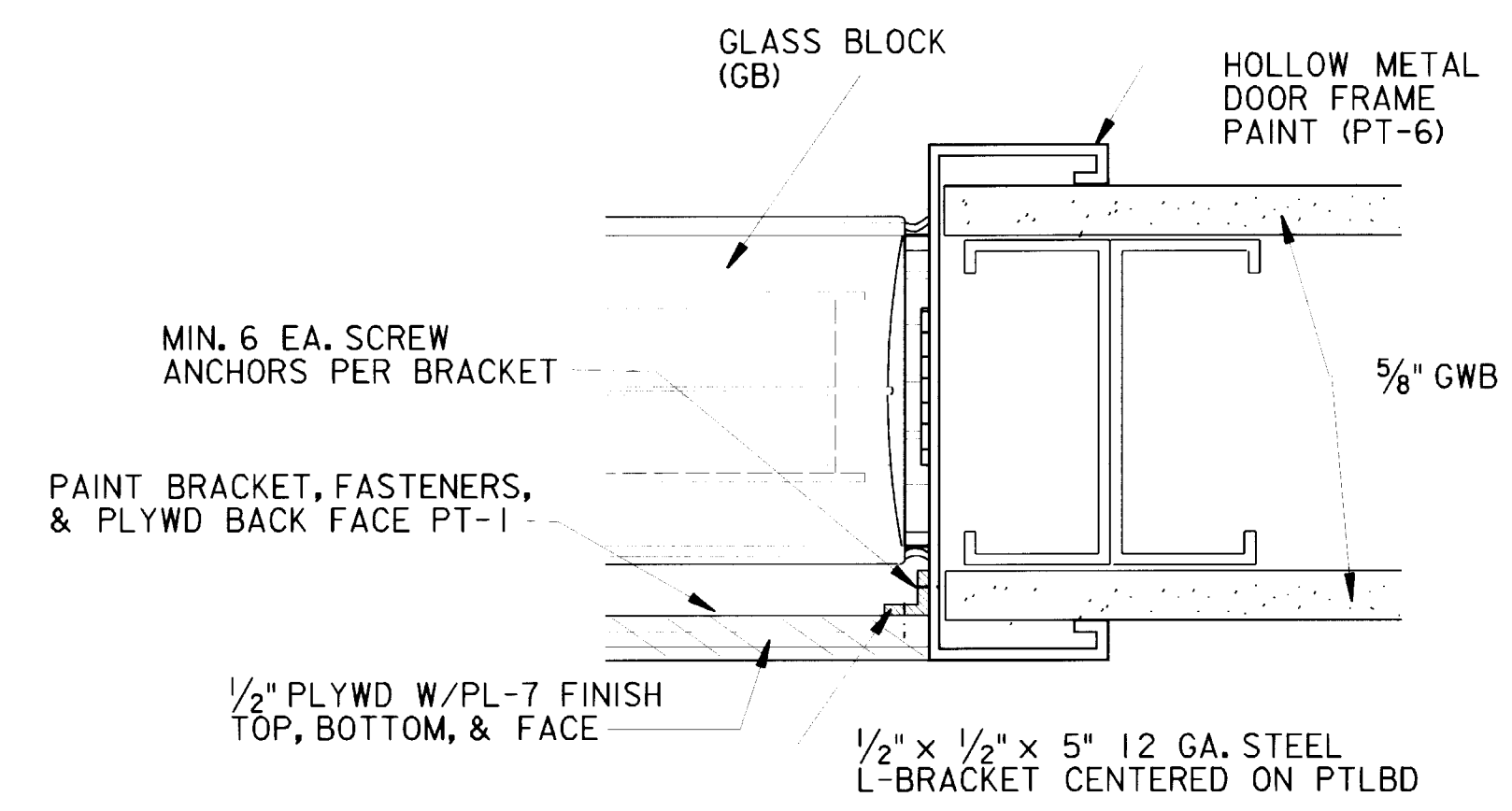
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B

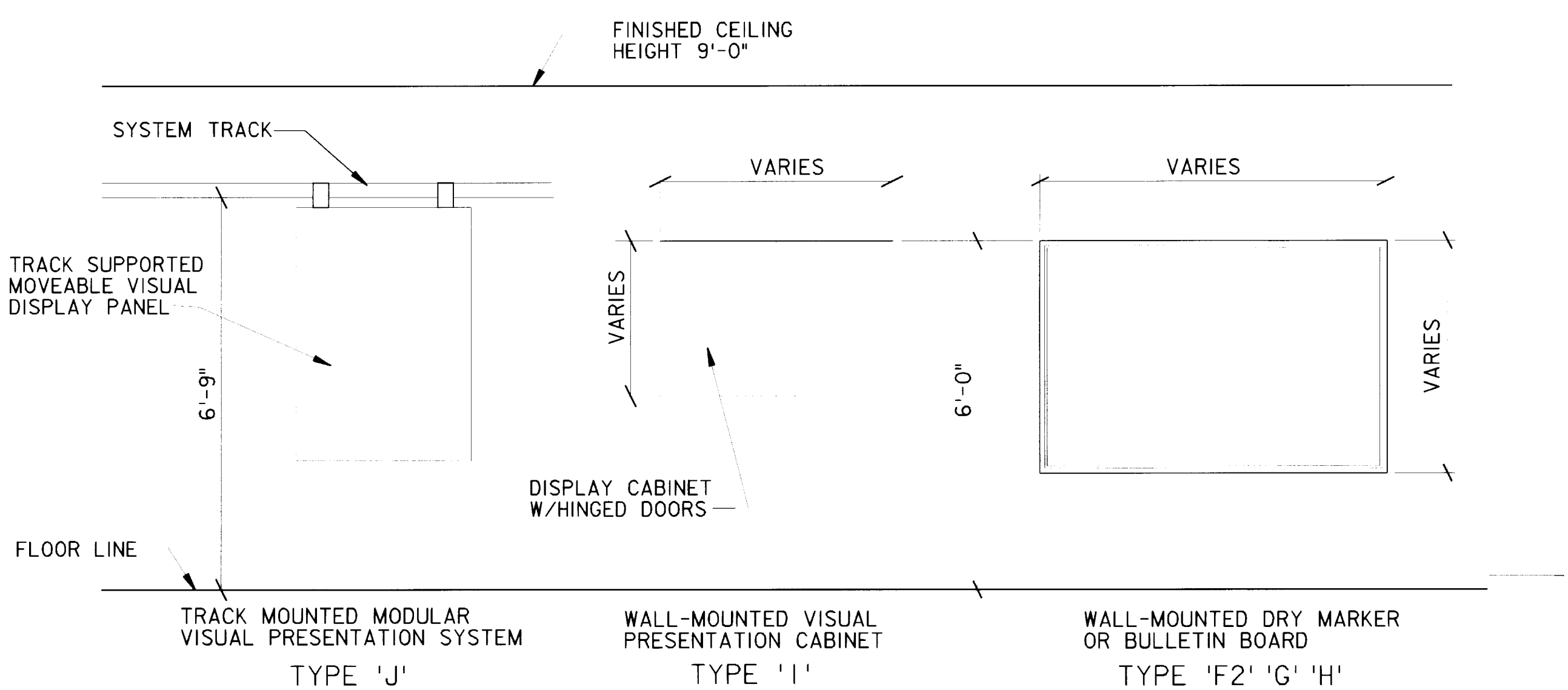
A



1 PARTIAL WALL ELEVATION @ ROOM SIGNAGE PANEL
A41 | A41 SCALE: 3/4" = 1'-0"



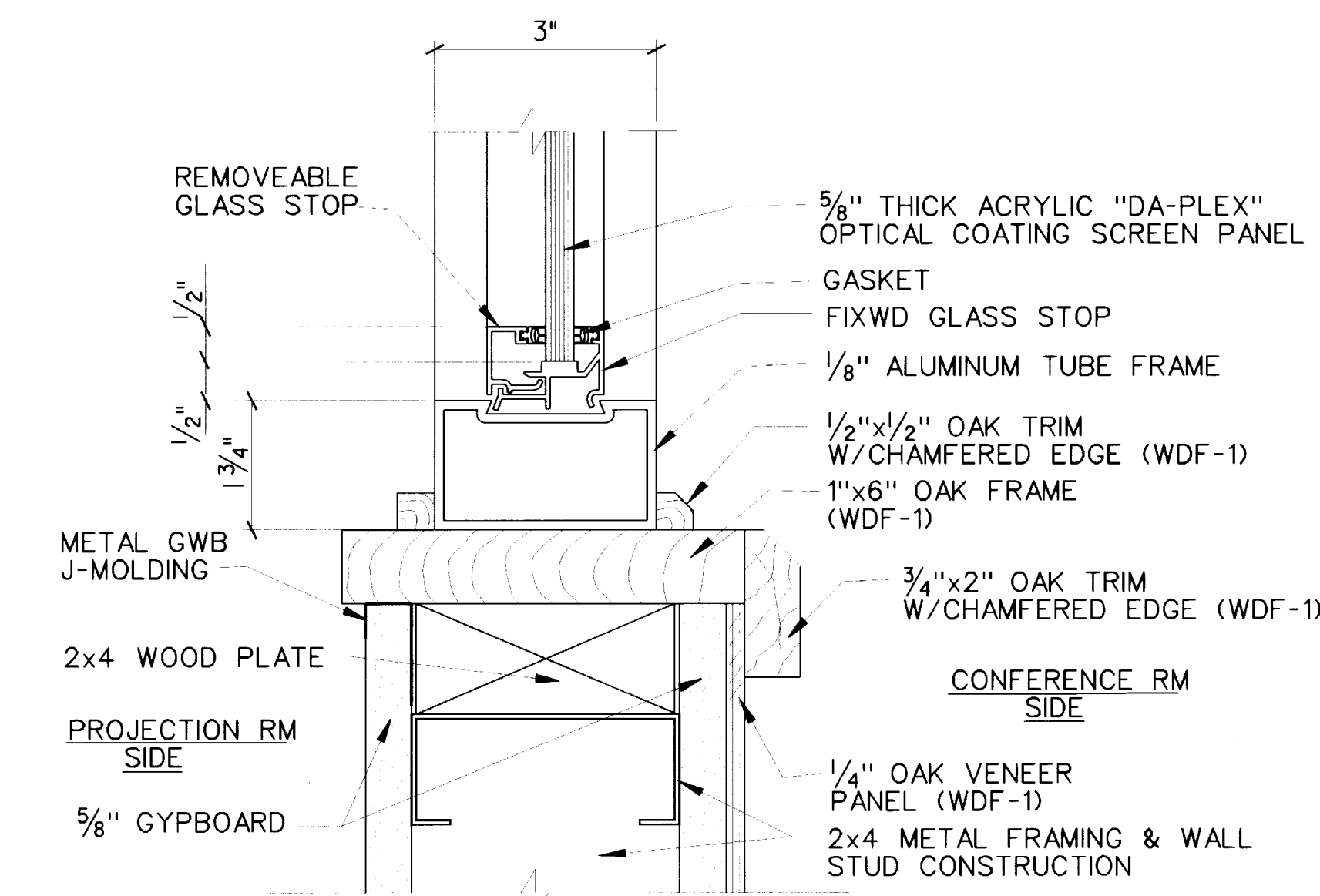
A SECTION @ WINDOW FRAME & SIGNAGE PANEL
A41 | A41 SCALE: HALF



1 TYPICAL VISUAL PRESENTATION INSTALLATION
A41 | A41 SCALE: 1/2" = 1'-0"

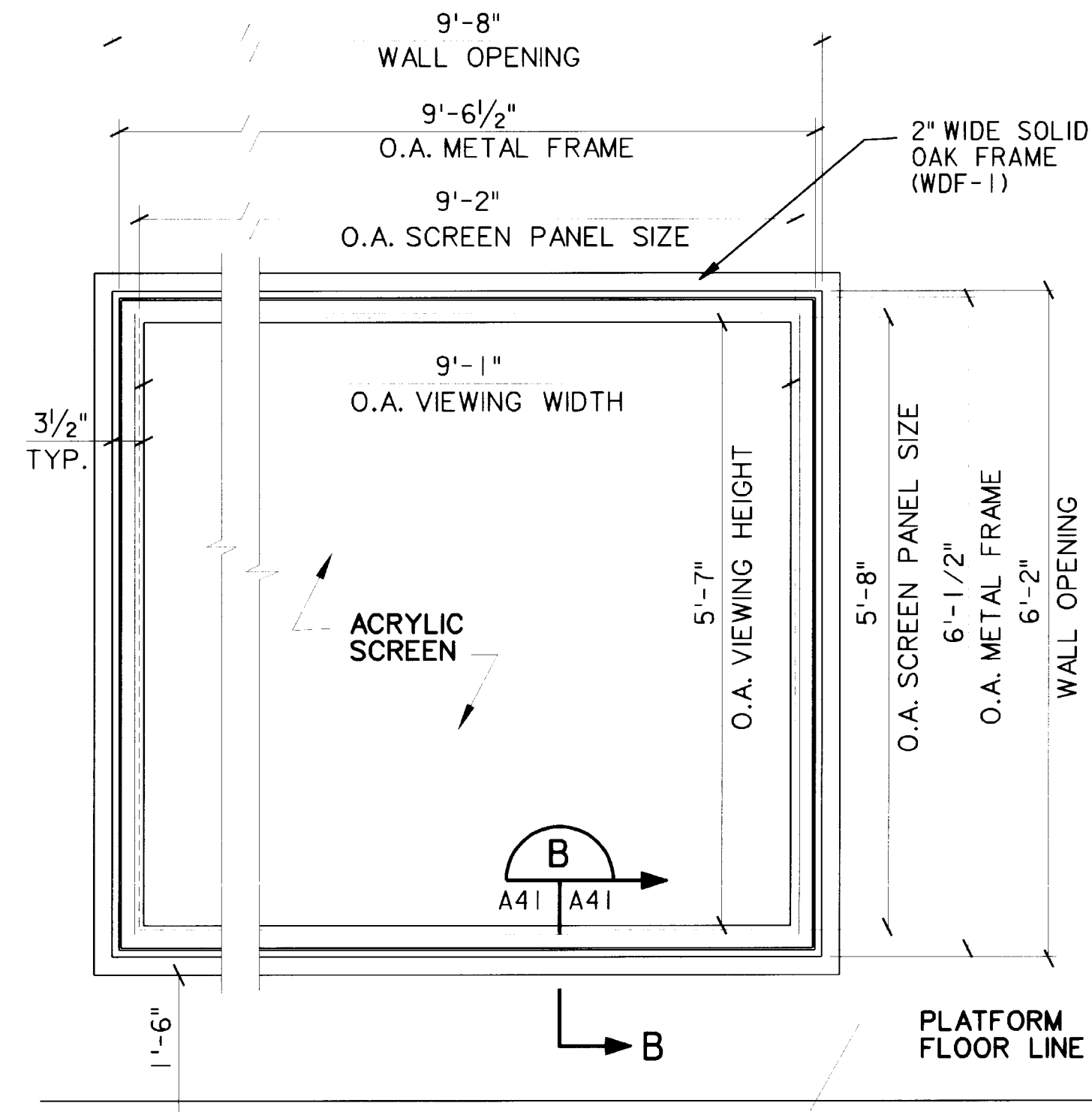
NOTE:
1. SEE SPEC. SEC. 10100.
2. PROVIDE STRUC. WALL SUPPORT FOR TRACK, CABINET, OR BOARD AS REQUIRED.

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

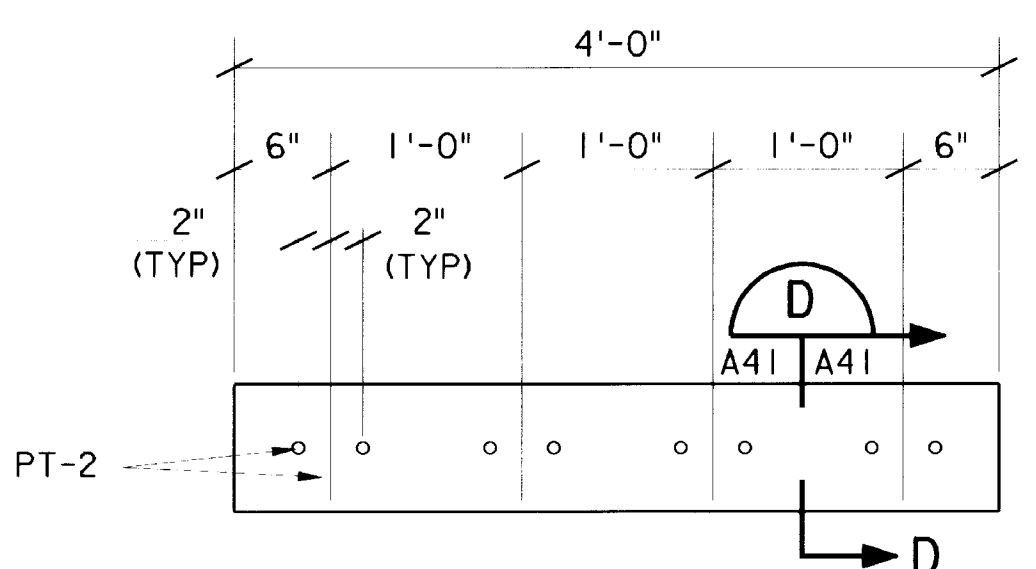


B TYPICAL SECTION THRU REAR PROJECTION SCREEN FRAME
A41 | A41 SCALE: HALF

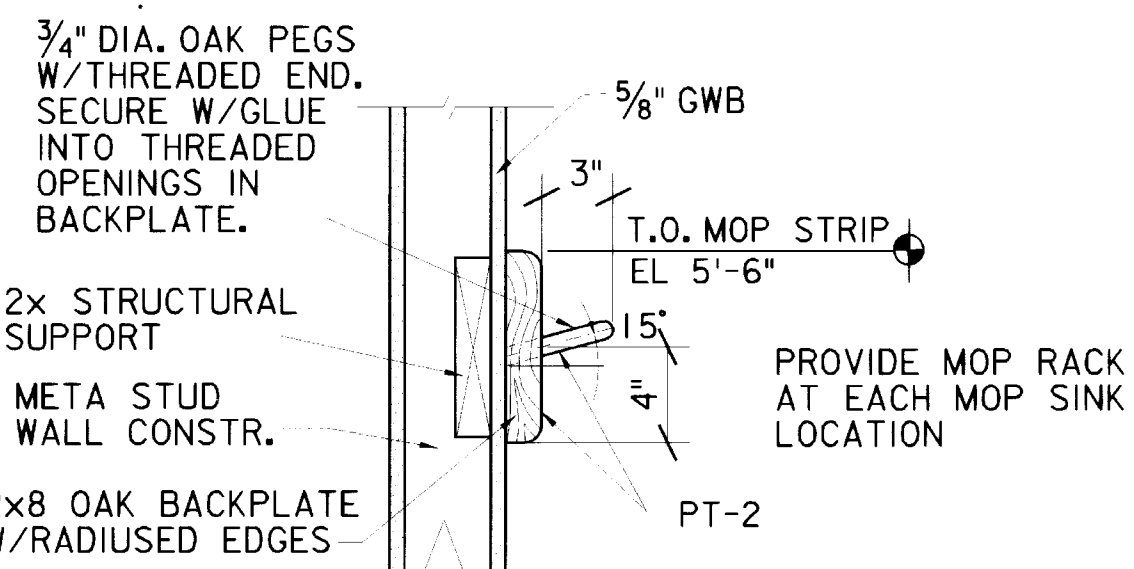
- NOTES:
1. DESIGN & DIMENSIONS SHOWN ARE BASED ON DA-LITE "DA-PLEX" RIGID ACRYLIC PROJECTION SCREEN PANEL W/FACORY INSTALLED ALUMINUM FRAME (OR EQUAL.)
 2. ALTERNATIVE MFGRS. OF EQUAL QUALITY & PERFORMANCE MAY REQUIRE THESE DETAILS TO BE REVISED AS SHOP DRAWINGS IN ORDER TO MAINTAIN THE REQUIRED VIEWING SCREEN DIMENSIONS.



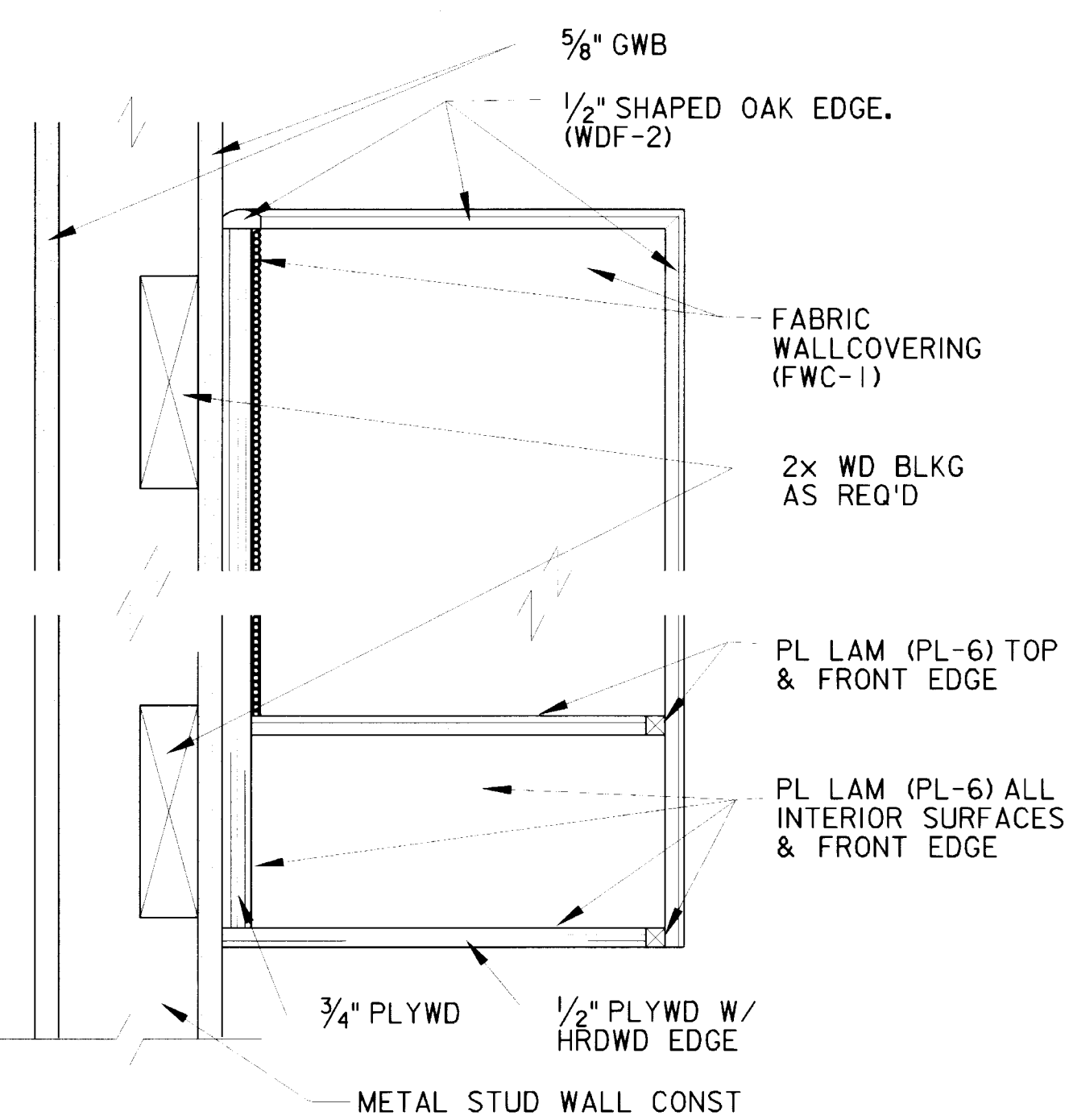
2 CONFERENCE RM WALL ELEVATION @ REAR PROJECTION SCREEN
A41 | A41 SCALE: 3/4" = 1'-0"



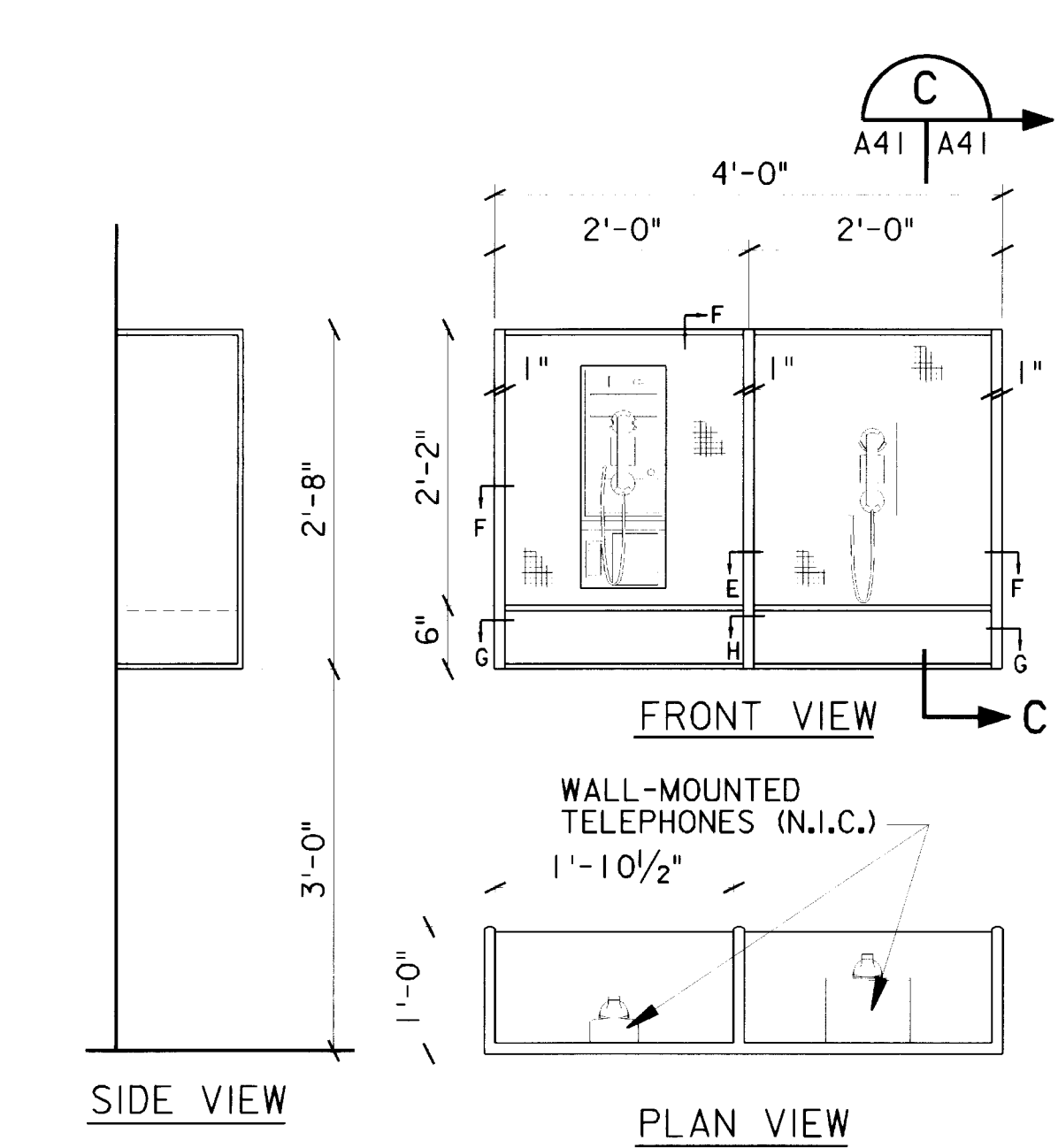
4 MOP RACK PEG SPACING ELEV.
A41 | A41 SCALE: 1" = 1'-0"



D MOP RACK SECTION DETAIL
A41 | A41 SCALE: 1 1/2" = 1'-0"

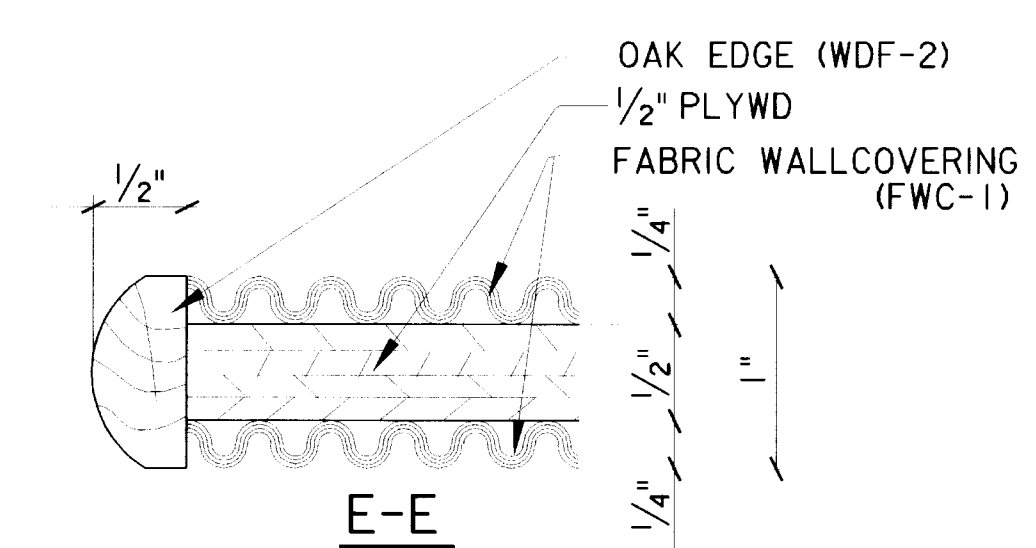


C SECTION THRU TELEPHONE CUBICLE
A41 | A41 SCALE: 3" = 1'-0"

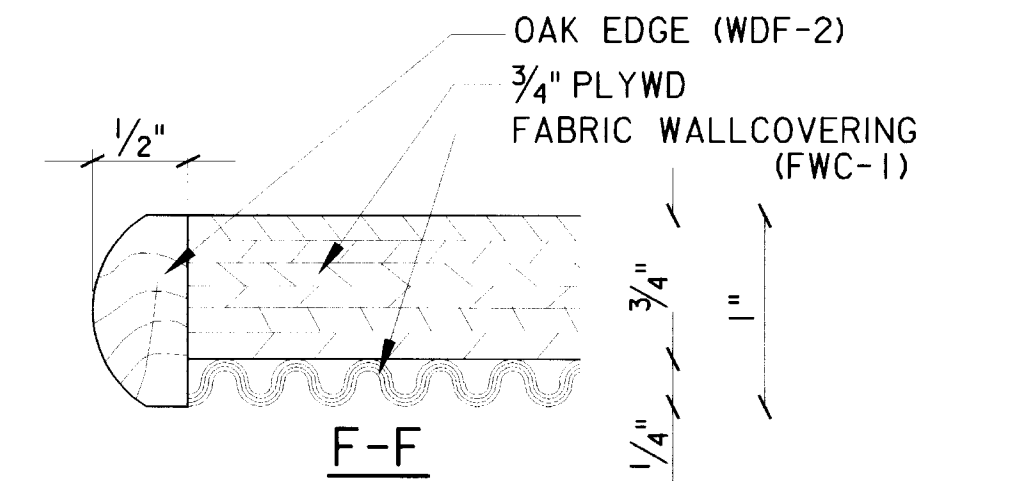


2 WALL-MOUNTED TELEPHONE CUBICLE
A41 | A41 SCALE: 3/4" = 1'-0"

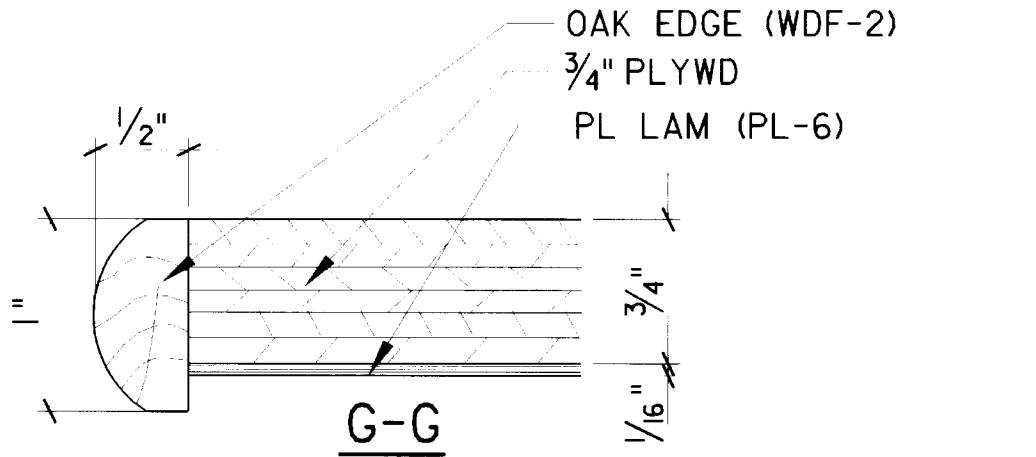
- NOTES:
1. TELEPHONES SHALL BE CENTERED ON EACH BACK WALL SPACE.
 2. PROVIDE ACCESS HOLES OF MINIMUM NECESSARY SIZE IN CUBICLE BACK WALL, TO BE LOCATED BEHIND EACH PHONE, FOR TELEPHONE LINE OR JACKS.
 3. COORDINATE LOCATION OF CUBICLES & ACCESS HOLES WITH COMMUNICATIONS WORK.
 4. SEE SHT. A-4 FOR LOCATION OF WALL RECESS FOR CUBICLE INSTALLATION LOCATION.



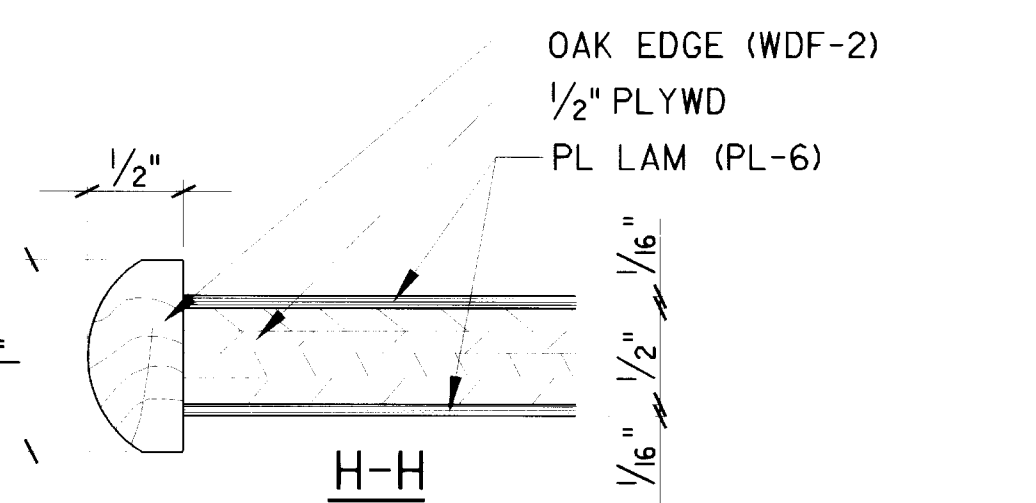
E-E VERTICAL DIVIDER PANEL @ SISAL WALLCOVERING FACE



F-F END PANELS/BACK PANEL @ SISAL WALLCOVERING FACE

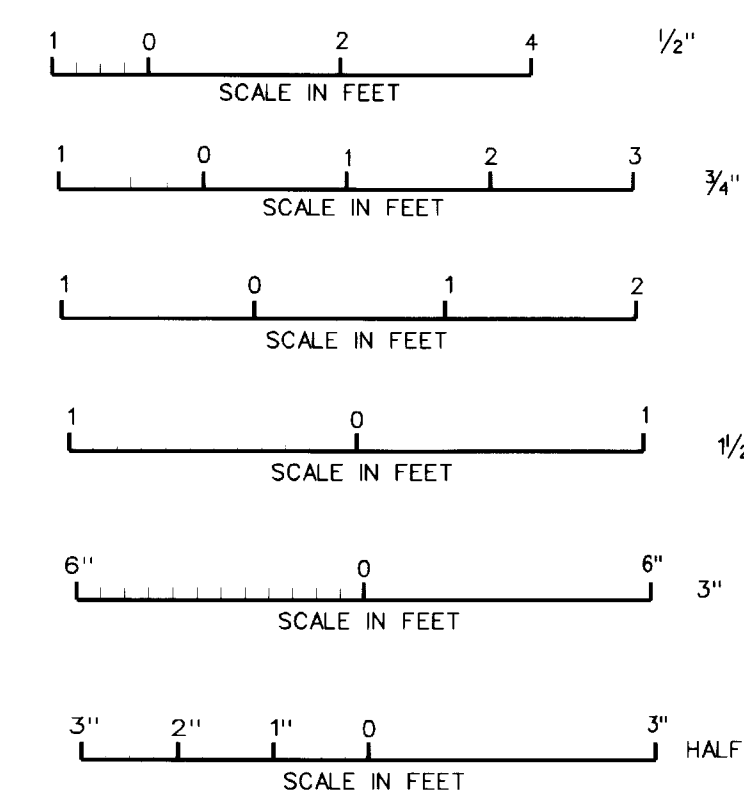


G-G END PANEL @ PLASTIC LAMINATE FACE



H-H VERTICAL DIVIDER PANEL @ PLASTIC LAMINATE FACE

3 PARTIAL SECTION THRU TELEPHONE CUBICLE PANELS
A41 | A41 SCALE: FULL



Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB PROJECT NO. JFS0963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.		
Checked by:	M.A.W.	Scale: AS SHOWN	Sheet number: A-41
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Plot scales: 8:1
		Dwg. No: AF 141-753-01	Design File: g501a041.3d
			File Not

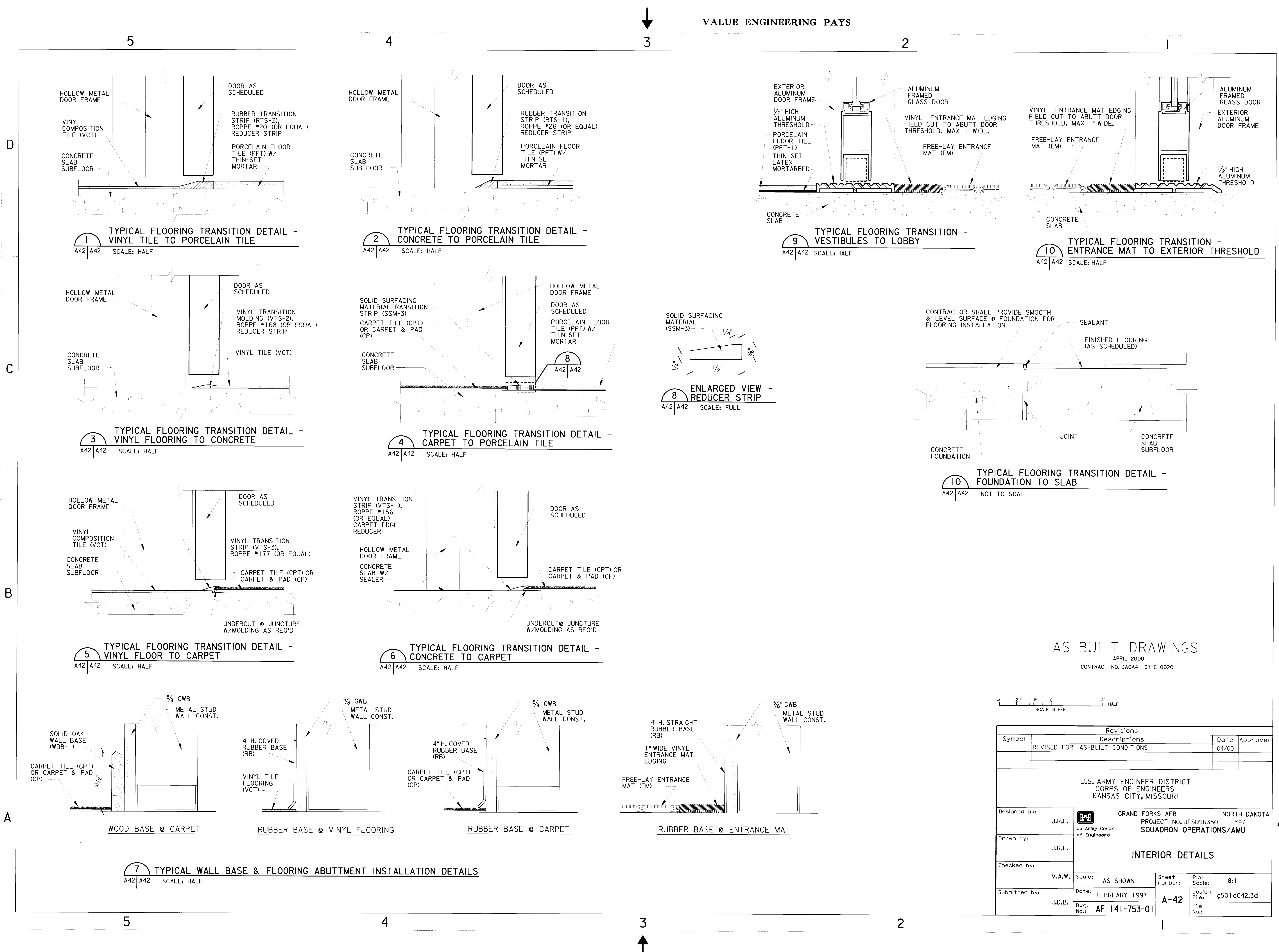
D

C

B

A

631-000-156-75 A-41



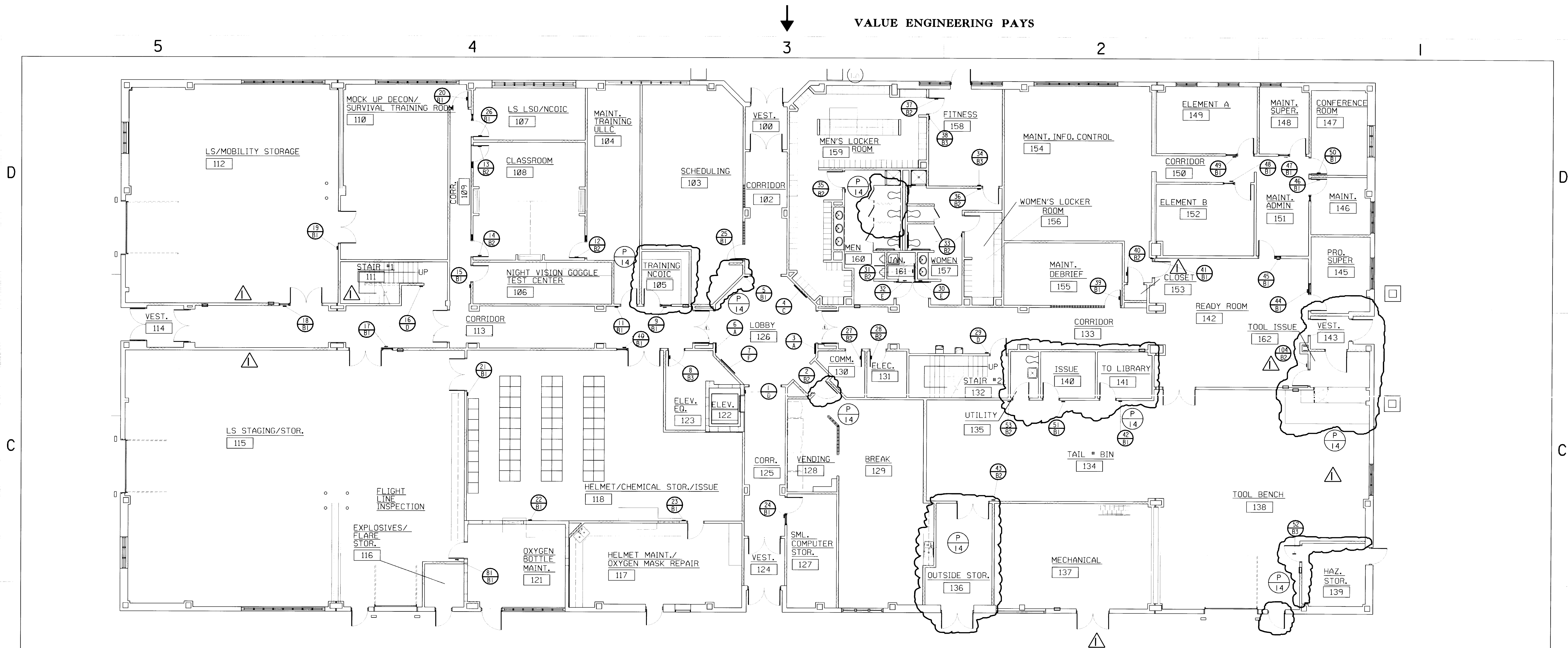
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

3" 2" 1" 0 3"
SCALE IN FEET
HALF

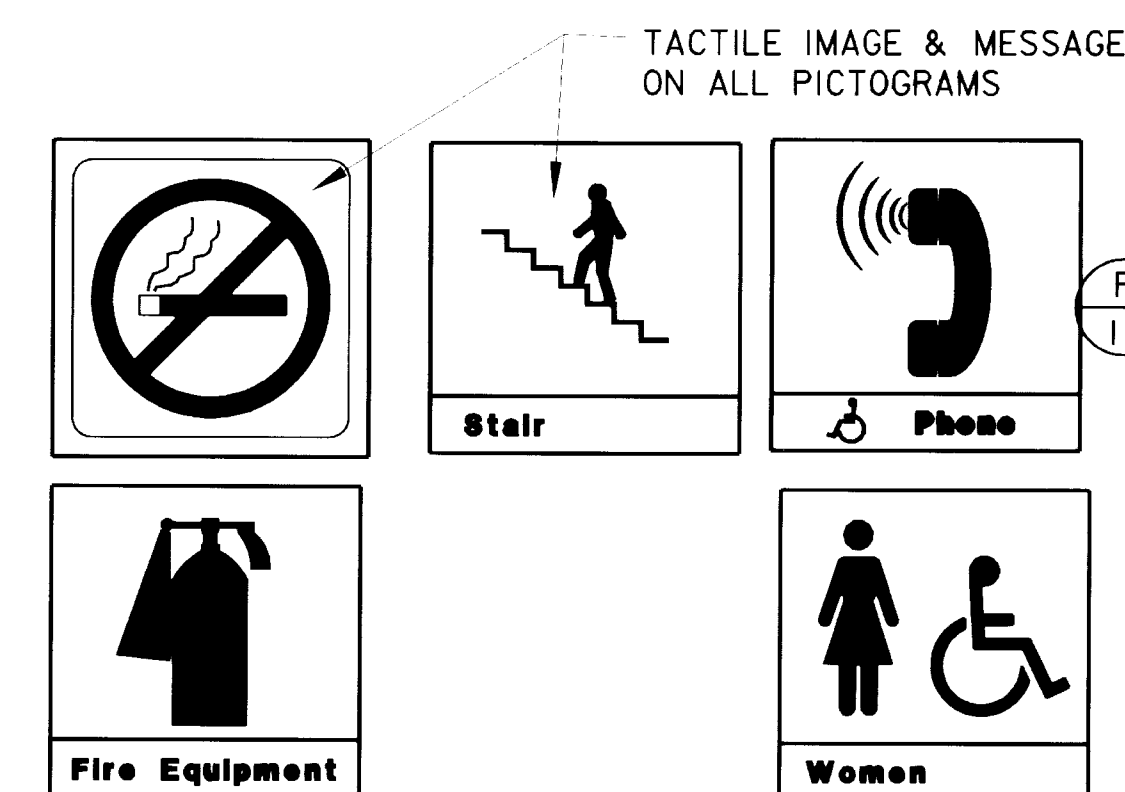
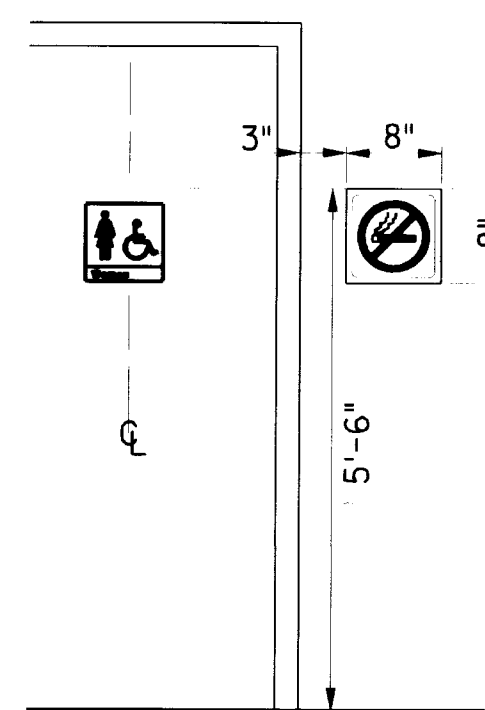
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.	INTERIOR DETAILS	
Checked by:	M.A.W.	Scale:	AS SHOWN
Submitted by:	J.D.B.	Date:	FEBRUARY 1997
		Dwg. No.:	AF 141-753-01
		Sheet number:	A-42
		Plot Scale:	8:1
		Design File:	g501a042.3d
		File No.:	

631-000-156-76 A-42



SIGNAGE LOCATIONS - 1ST FLOOR PLAN
A43 | A43 SCALE: 1/8" = 1'-0"

- SIGNAGE NOTES:**
- SEE SHT. A-24 FOR EXACT LOCATION AND MOUNTING HEIGHT GLASS DOOR DIRECTORY (TYPE 'C') AND BULLETIN BOARDS (TYPE 'F').
 - SEE SPECIFICATION SECTION 10440 FOR COMPLETE INTERIOR SIGNAGE SPECIFICATIONS

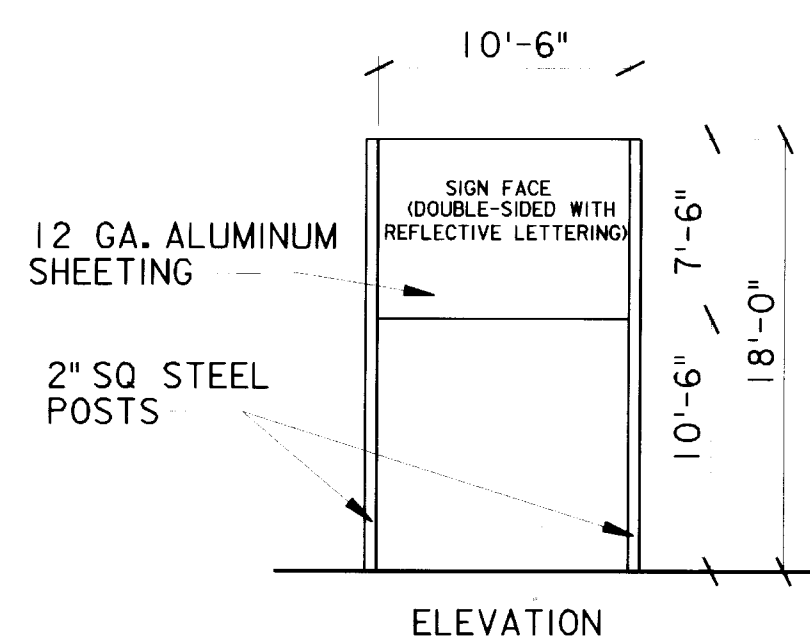


REGULATORY PICTOGRAMS - TYPE 'D' & 'E'
A43 | A43 N.T.S.

SIGNAGE/VISUAL DISPLAY LEGEND		
TYPE	QTY	DESCRIPTION
A	5	DIRECTIONALS
B1	55	ROOM I.D. W/REPLACEMENT PANEL
B2	21	PERMANENT ROOM I.D.
B3	7	ROOM I.D. SPECIAL
C	1	GLASS-ENCLOSED DIRECTORY W/CHANGEABLE LETTERS
D	6	REGULATORY-MANDATORY
E	4	REGULATORY-SERVICE
F	3	GLASS-ENCLOSED BULLETIN BOARD
F2	2	FRAMED BULLETIN BOARD
G	30	FRAMED MARKER BOARD
H	2	FRAMED MARKER/BULLETIN BOARD COMBO
I	2	VISUAL DISPLAY CABINET W/ HINGED DOORS
J	-	VISUAL DISPLAY COMPONENT TRACK SYSTEM

NUMBER SIGN TYPE
SEE MASTER LIST FOR SIGN COPY CONTENT.

- SEE EXPANDED PLANS FOR LOCATION OF TYPES F2, G, H, I, AND J.
- SEE SHT. A-41 FOR MOUNTING HEIGHTS OF TYPES F2, G, H, I, AND J.
- SEE SHT. A-24 FOR MOUNTING LOCATIONS OF C AND F.
- SEE EXPANDED PLANS FOR OVERALL DIMENSIONS OF TYPES F2, G, AND H.



NOTES:

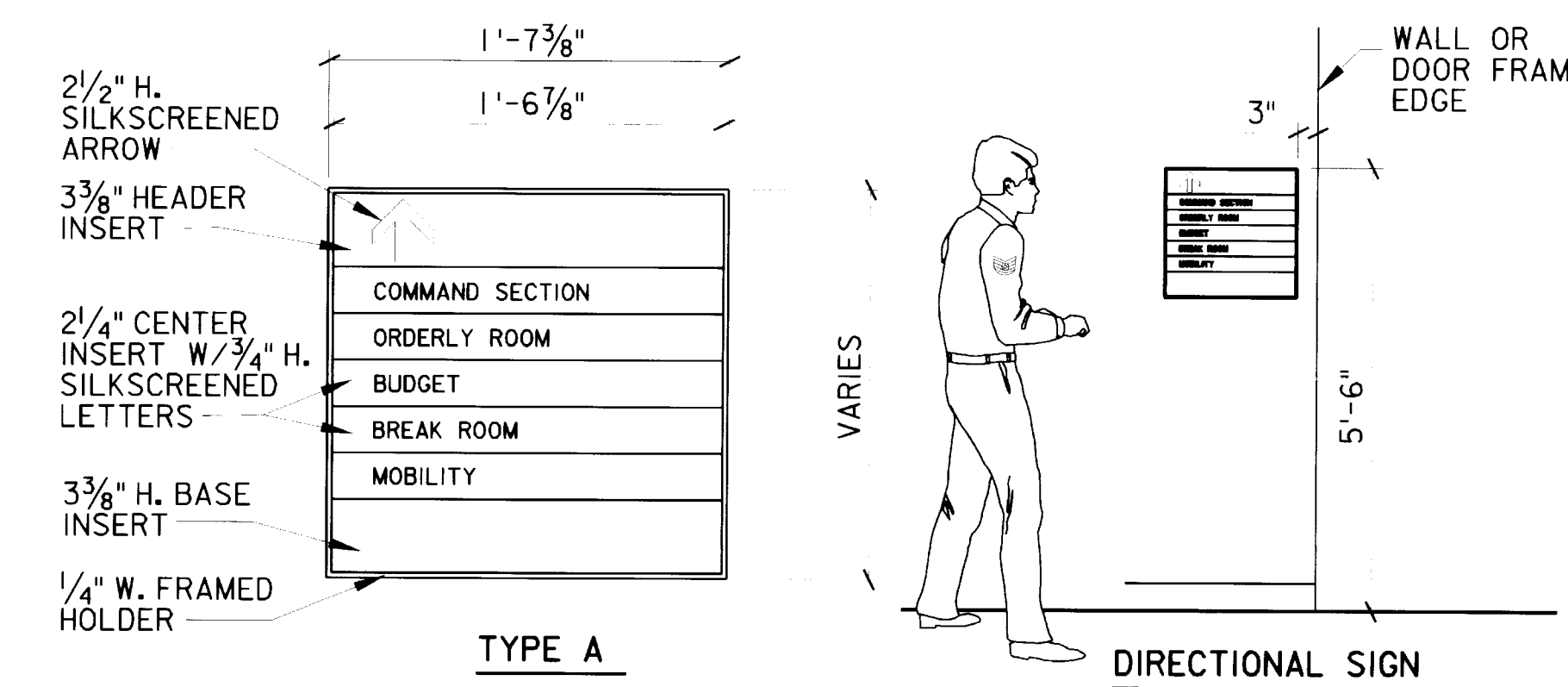
- PRIMARY FACILITY ID PANEL SHALL CONFORM TO HQ AIR MOBILITY COMMAND & GRAND FORKS AFB SIGN STANDARDS FOR TYPE B3 TO INCLUDE MATERIALS, FABRICATION, LETTERING STYLE AND SIZES, FINISHES, DIMENSIONS & INSTALLATION.
- SEE SPEC SECTION 10430 FOR COMPLETE SPECIFICATIONS FOR EXTERIOR SIGNAGE.
- GOVERNMENT CONTRACT REPRESENTATIVE SHALL PROVIDE AND VERIFY FACILITY NAME AND BUILDING NO. TO THE CONTRACTOR AT HIS REQUEST.
- SEE CIVIL SITE PLAN, SHT C-2 FOR EXTERIOR SIGN LOCATION, PLAN VIEW.

EXTERIOR POST & PANEL BLDG I.D. SIGNAGE
A43 | A43 N.T.S.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

SCALE IN FEET 1/4"



DIRECTIONAL SIGNAGE - TYPE 'A'
A43 | A43 N.T.S.

Revisions			
Symbol	Descriptions	Date	Approved
1	MISC. AMENDED REVISIONS	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by: JRH
Drawn by: JRH/CAM
Checked by: MAW
Submitted by: JDB

GRAND FORKS AFB
PROJECT NO. JFSD963501
US Army Corps of Engineers
NORTH DAKOTA
FY97
SQUADRON OPERATIONS/AMU

SIGNAGE DETAILS

Scale: AS SHOWN
Date: FEBRUARY 1997
Dwg. No.: AF 141-753-01

Sheet number: A-43
Plot Scale: 8:1
Design File: g501a043.3d
File No.:

631-000-156-77 A-43

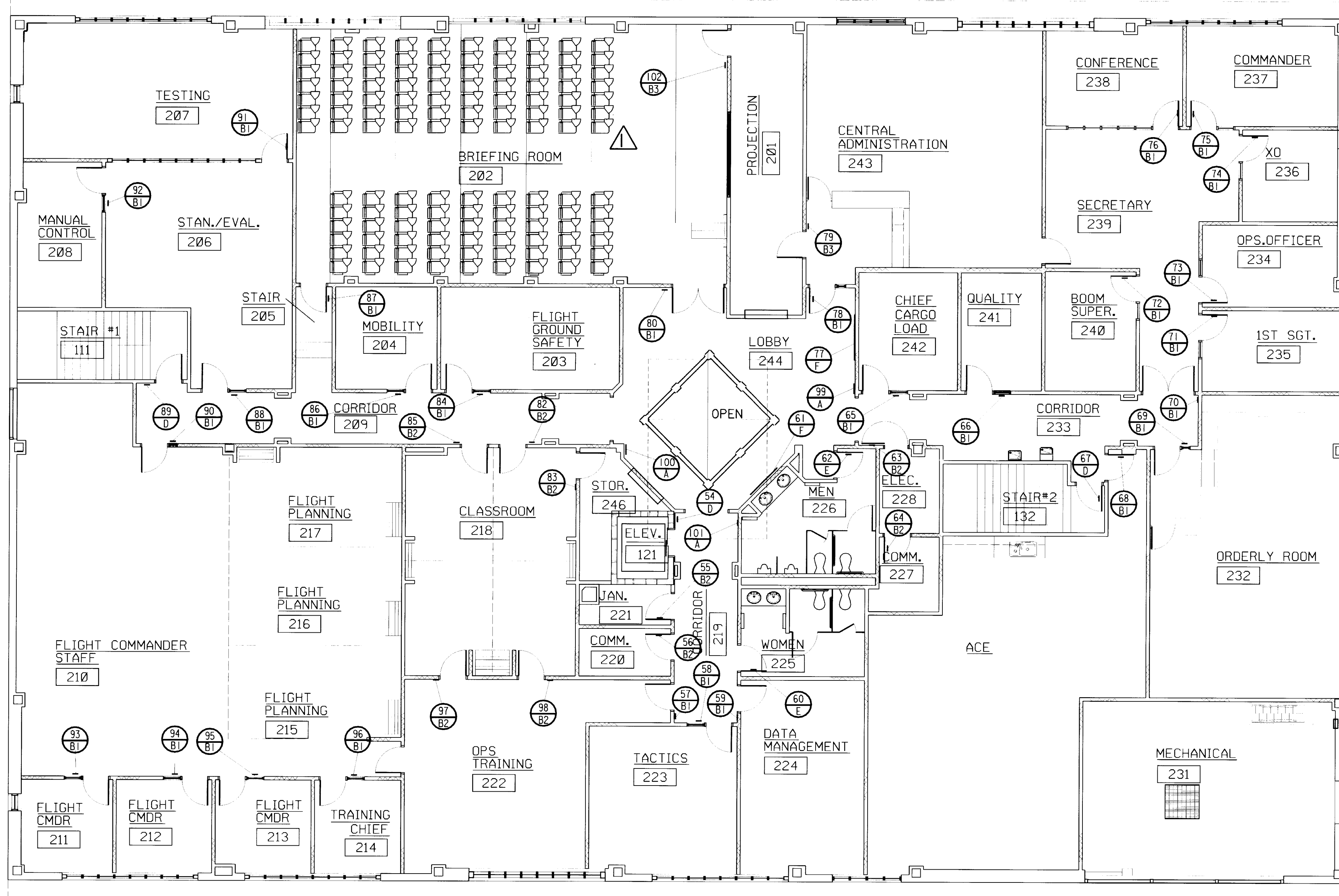
5

4

3

2

1



1 SIGNAGE LOCATIONS - 2ND FLOOR PLAN
A44/A44 SCALE: 1/8" = 1'-0"

SIGNAGE/VISUAL DISPLAY LEGEND		
TYPE	QTY	DESCRIPTION
A	5	DIRECTIONALS
B1	55	ROOM I.D. W/REPLACEMENT PANEL
B2	21	PERMANENT ROOM I.D.
B3	7	ROOM I.D. SPECIAL
C	1	GLASS-ENCLOSED DIRECTORY W/CHANGEABLE LETTERS
D	6	REGULATORY-MANDATORY
E	4	REGULATORY-SERVICE
F	3	GLASS-ENCLOSED BULLETIN BOARD
F2	2	FRAMED BULLETIN BOARD
G	30	FRAMED MARKER BOARD
H	2	FRAMED MARKER/BULLETIN BOARD COMBO
I	2	VISUAL DISPLAY CABINET W/ HINGED DOORS
J	-	VISUAL DISPLAY COMPONENT TRACK SYSTEM

NUMBER SIGN TYPE
SEE MASTER LIST FOR SIGN COPY CONTENT.

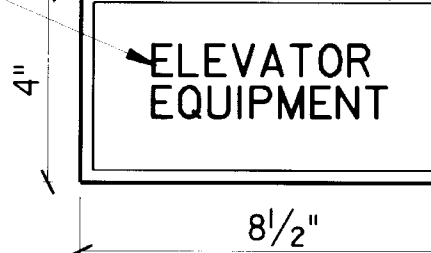
- SEE EXPANDED PLANS FOR LOCATION OF TYPES F2, G, H, I, AND J.
- SEE SHT. A-41 FOR MOUNTING HEIGHTS OF TYPES F2, G, H, I, AND J.
- SEE SHT. A-24 FOR MOUNTING LOCATIONS OF C AND F.
- SEE EXPANDED PLANS FOR OVERALL DIMENSIONS OF TYPES F2, G, AND H.

SIGNAGE NOTES:

- SEE SHT. A-24 FOR EXACT LOCATION AND MOUNTING HEIGHT GLASS DOOR DIRECTORY (TYPE 'C') AND BULLETIN BOARDS (TYPE 'F').
- SEE SPECIFICATION SECTION 10440 FOR COMPLETE INTERIOR SIGNAGE SPECIFICATIONS

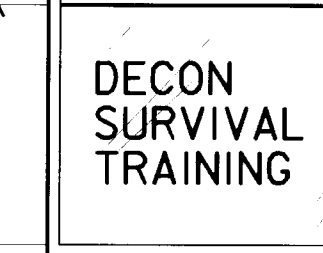
5/8" H. RAISED LETTERS & BRAILLE CHARACTERS ON OPAQUE HEADER

MOLDED PLASTIC FRAME/HOLDER W/1/4" BEVELED EDGE



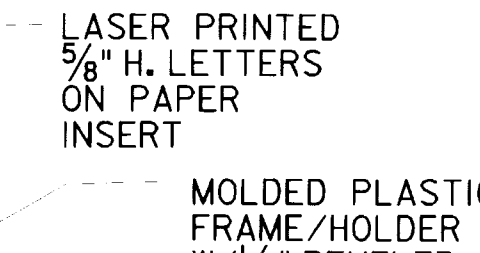
TYPE B3

2" H. RAISED NUMBERS & BRAILLE CHARACTERS ON OPAQUE HEADER



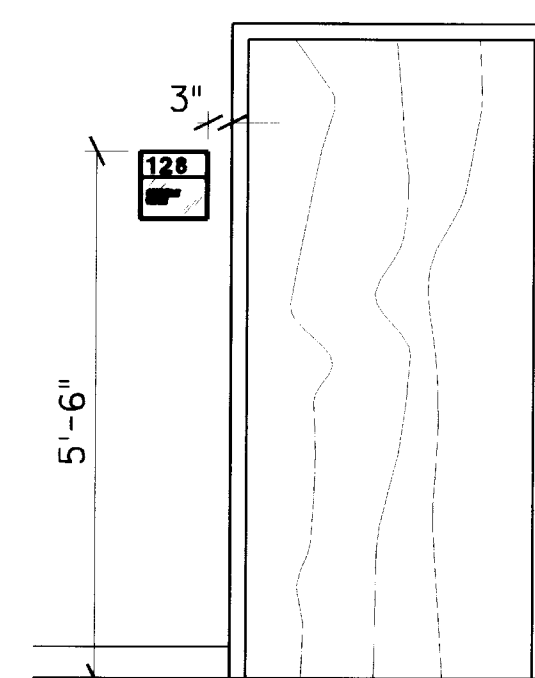
TYPE B1

5/8" H. RAISED LETTERS & BRAILLE CHARACTERS ON OPAQUE HEADER

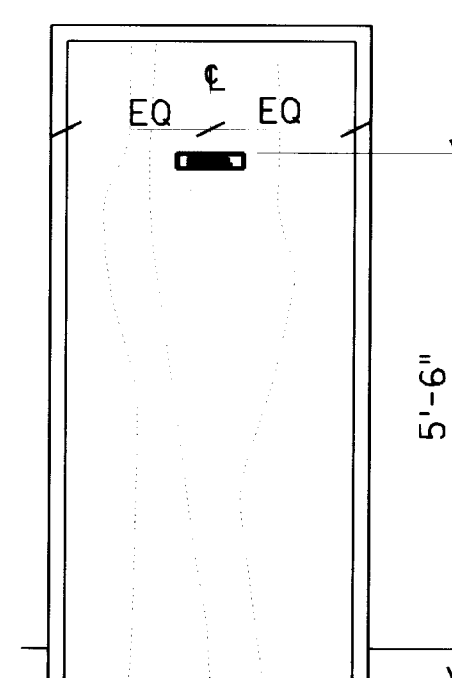


TYPE B2

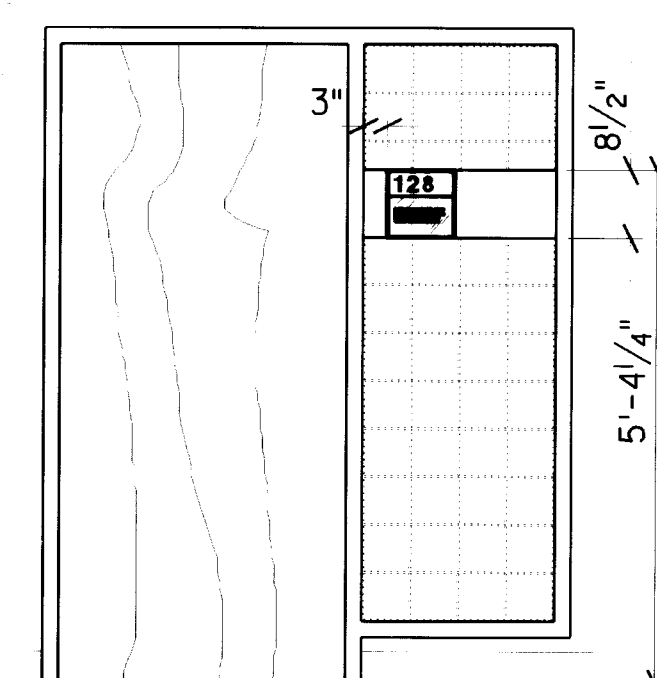
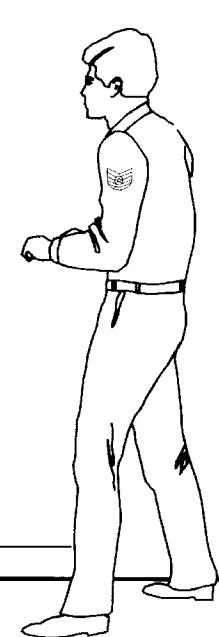
5 ROOM IDENTIFICATION SIGNAGE - TYPE 'B'
A44/A44 SCALE: 3/8" = 1'-0"



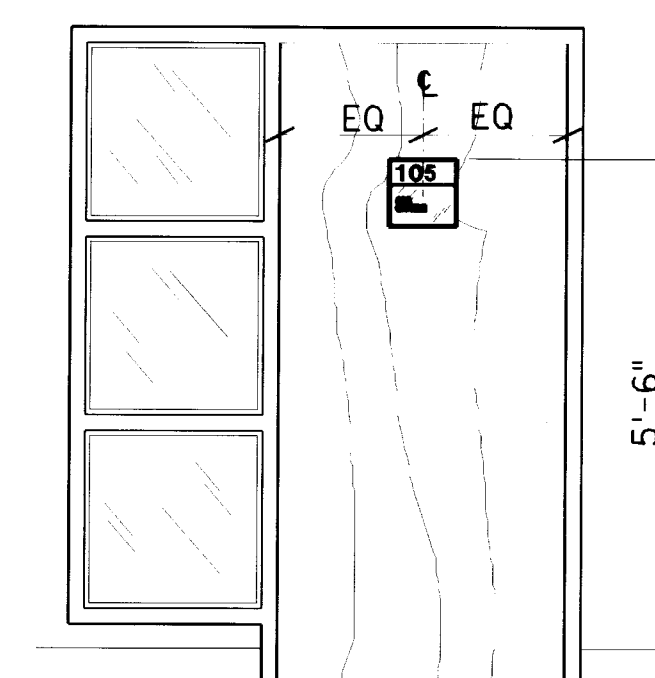
TYPE B1 WALL MOUNTED



TYPE B2 DOOR MOUNTED



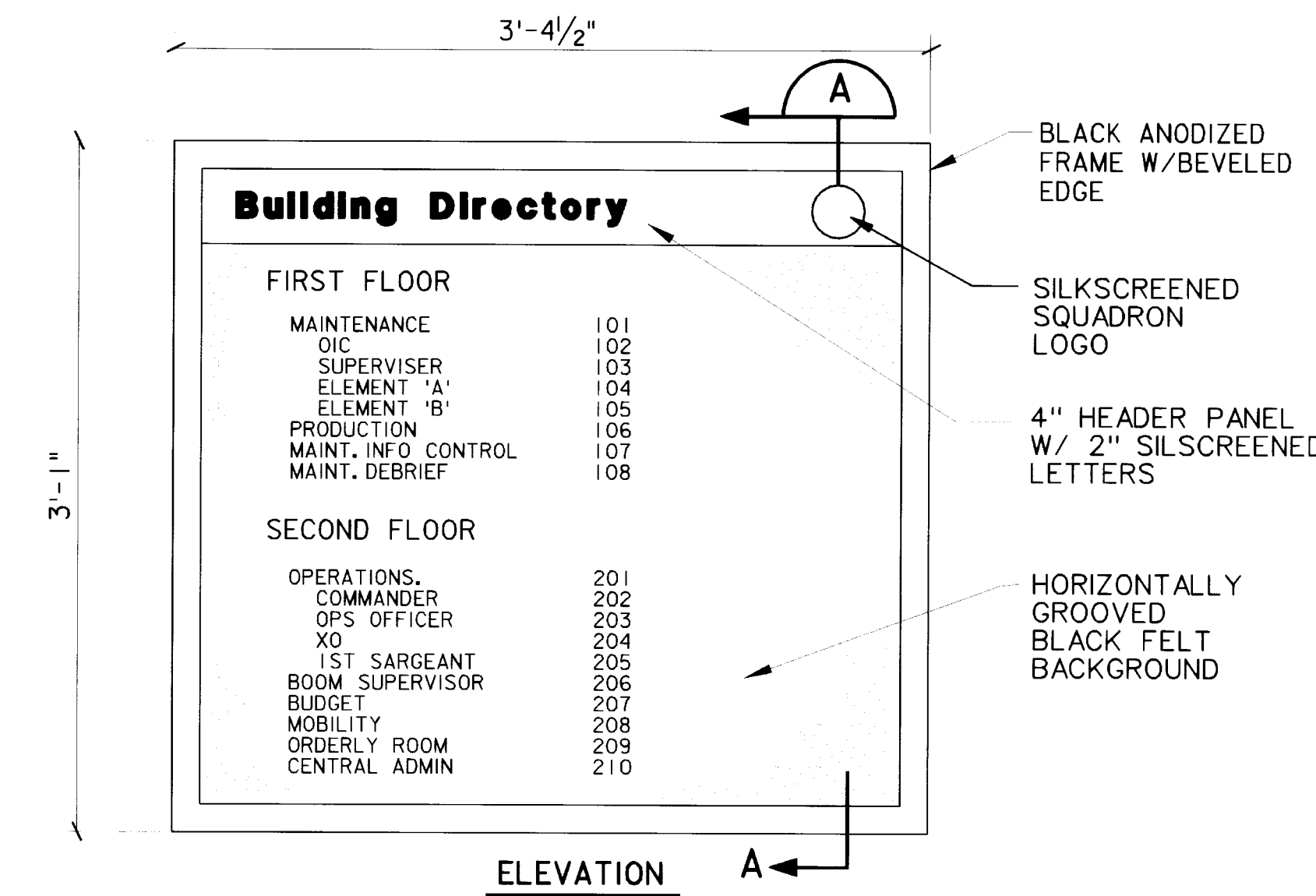
TYPE B1 PANEL MOUNTED



TYPE B1 DOOR MOUNTED

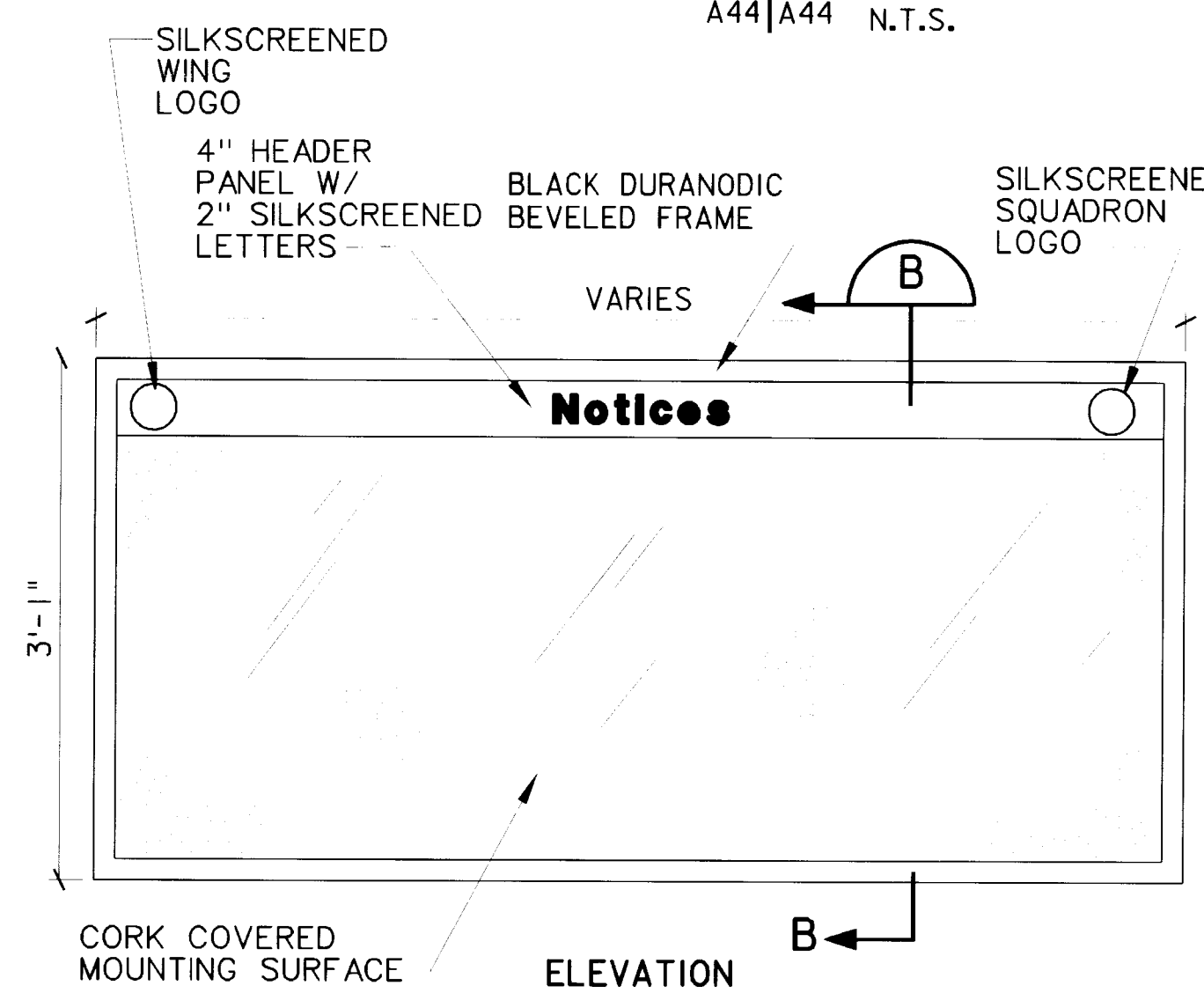
2 TYPICAL LOCATIONS - ROOM IDENTIFICATION SIGNAGE - TYPE 'B'
A44/A44 SCALE: 1/2" = 1'-0"

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DCA41-97-C-0020



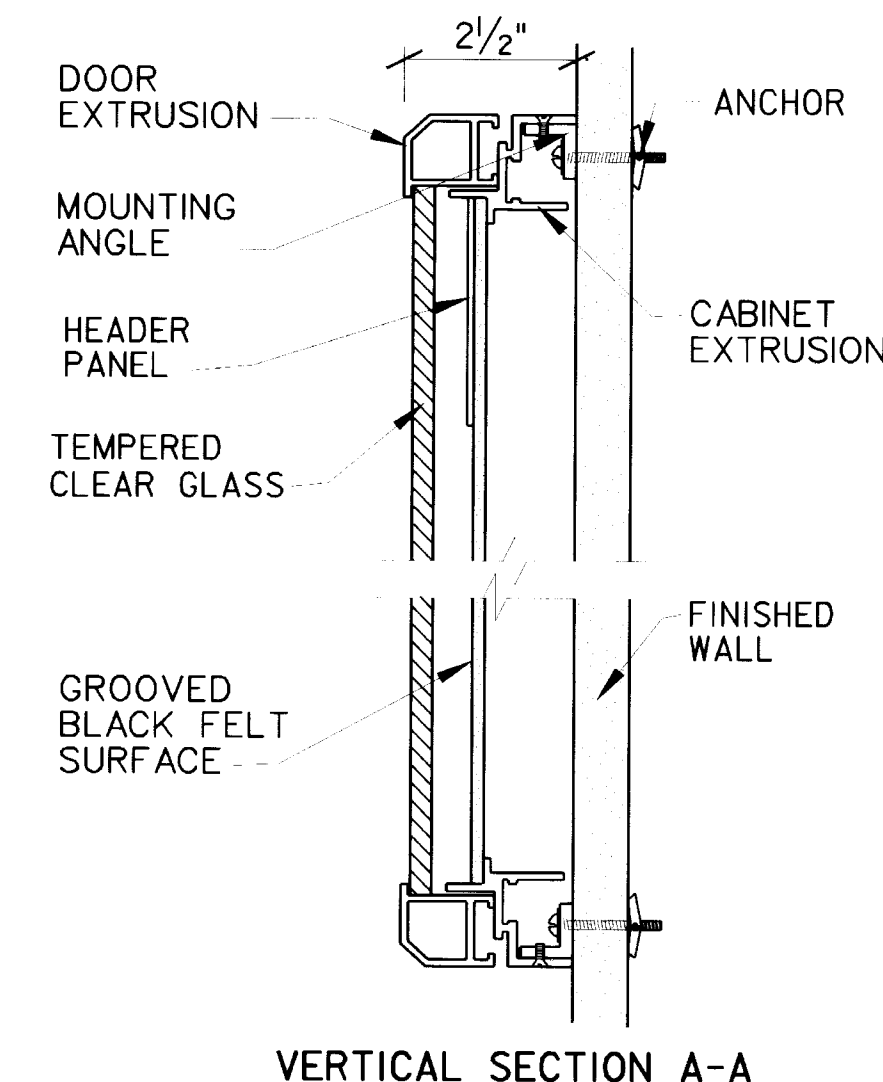
ELEVATION A

3 BUILDING DIRECTORY-TYPE 'C'
A44/A44 N.T.S.

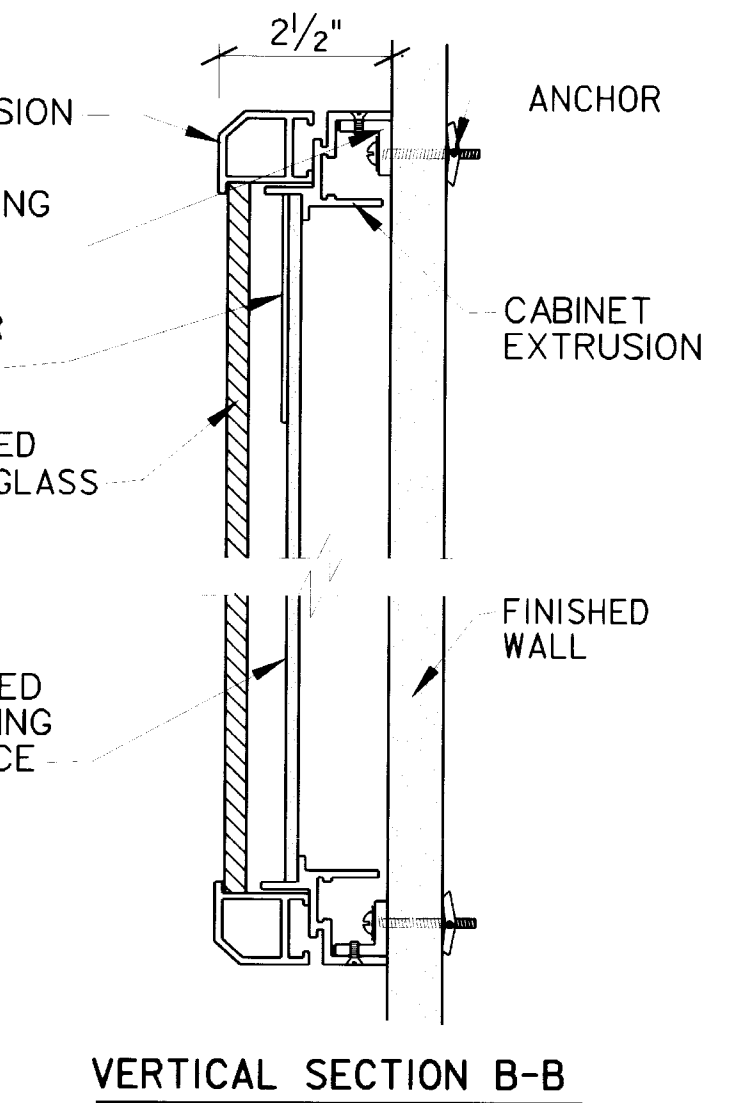


ELEVATION B

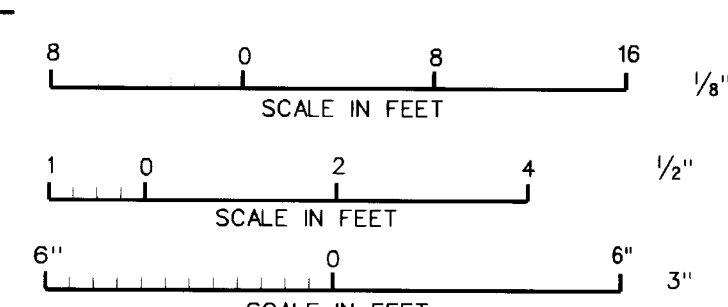
4 BULLETINBOARD DETAILS - TYPE 'F'
A44/A44 N.T.S.



VERTICAL SECTION A-A



VERTICAL SECTION B-B



Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	J.R.H.		
Checked by:	M.A.W.		
Submitted by:	J.D.B.		
Scale:	AS SHOWN	Sheet number:	Plot Scale: 8:1
Date:	FEBRUARY 1997	Design File:	g501a044.3d
Dwg. No.:	AF 141-753-01	File No.:	

SIGNAGE DETAILS

A-44

631-000-156-78 A-44

INTERIOR SIGNAGE SCHEDULE - FIRST FLOOR

SIGN NO.	TYPE	MOUNTING SURFACE	PERMANENT GRAPHICS			INSERT GRAPHICS	SIZE (W" x H")	REMARKS
			ROOM NO.	COPY	PICTOGRAPH/SYMBOL			
1	D	WALL	-	ELEVATOR	ELEVATOR	-	8 1/2" X 8 1/2"	
2	B2	WALL	-	VENDING/BREAK ROOM	-	-	8 1/2" X 2"	
3	A	WALL	-	MAINTENANCE STAFF READY ROOM INFO CONTROL MAINTENANCE DEBRIEF TOOL BENCH/TAIL *BIN	UP ARROW ON HEADER (JUSTIFY LEFT)	-	18" X	
4	C	WALL	-	BUILDING DIRECTORY	SQUADRON EMBLEM	-	40 1/2" X 37"	
5	B1	WALL	112	-	-	SCHEDULING	8 1/2" X 8 1/2"	
6	A	WALL	-	TRAINING HELMET/CHEM STORAGE LS MOBILITY STORAGE LS STAGING/STORAGE MOCK-UP DECON ULLC/TRAINING	UP ARROW ON HEADER (JUSTIFY LEFT)	-	18" X	
7	F	WALL	-	NOTICES	SQUADRON EMBLEM	-	40 1/2" X 37"	
8	B3	DOOR	-	ELEVATOR EQUIPMENT	-	-	8 1/2" X 4"	
9	B1	PANEL	113	-	-	TRAINING NCOIC	8 1/2" X 8 1/2"	
10	B1	PANEL	120	-	-	HELMET/CHEMICAL STORAGE/ISSUE	8 1/2" X 8 1/2"	
11	B1	WALL	114	-	-	ULLC MAINT. TRAINING	8 1/2" X 8 1/2"	
12	B2	DOOR	-	CLASSROOM 'A'	-	-	8 1/2" X 2"	
13	B2	DOOR	-	CLASSROOM 'C'	-	-	8 1/2" X 2"	
14	B2	DOOR	-	CLASSROOM 'B'	-	-	8 1/2" X 8 1/2"	
15	B1	WALL	115	-	-	NIGHT VISION GOGGLE TESTING	8 1/2" X 8 1/2"	
16	D	WALL	-	STAIRS	STAIR	-	8 1/2" X 8 1/2"	
17	B1	PANEL	119	-	-	LS STAGING	8 1/2" X 8 1/2"	
18	B1	PANEL	118	-	-	LS/MOBILITY STORAGE	8 1/2" X 8 1/2"	
19	B1	WALL	117	-	-	MOCK-UP/DECON SURVIVAL TRAINING	8 1/2" X 8 1/2"	
20	B1	DOOR	117	-	-	MOCK-UP/DECON SURVIVAL TRAINING	8 1/2" X 8 1/2"	
21	B1	WALL	119	-	-	LS STAGING	8 1/2" X 8 1/2"	
22	B1	WALL	121	-	-	HELMET MAINTENANCE/OXYGEN MASK REPAIR	8 1/2" X 8 1/2"	
23	B1	WALL	122	-	-	OXYGEN BOTTLE MAINTENANCE	8 1/2" X 8 1/2"	
24	B1	PANEL	123	-	-	COMPUTER STORAGE	8 1/2" X 8 1/2"	
25	B1	DOOR	112	-	-	SCHEDULING	8 1/2" X 8 1/2"	
26	B1	DOOR	116	-	-	LS/LSO/NCOIC	8 1/2" X 8 1/2"	
27	B2	DOOR	-	COMMUNICATIONS	-	-	8 1/2" X 8 1/2"	
28	B2	DOOR	-	ELECTRICAL	-	-	8 1/2" X 2"	
29	D	WALL	-	STAIR	STAIR	-	8 1/2" X 8 1/2"	
30	E	DOOR	-	WOMEN	WOMAN/HANDICAP	-	8 1/2" X 8 1/2"	
31	B2	DOOR	-	JANITOR	-	-	8 1/2" X 2"	
32	E	DOOR	-	MEN	MAN/HANDICAP	-	8 1/2" X 8 1/2"	
33	B2	WALL	-	LOCKER ROOM	-	-	8 1/2" X 2"	
34	B3	WALL	-	WOMEN'S LOCKER ROOM	-	-	8 1/2" X 4"	
35	B2	WALL	-	LOCKER ROOM	-	-	8 1/2" X 2"	
36	B2	WALL	-	FITNESS ROOM	-	-	8 1/2" X 2"	
37	B2	DOOR	-	FITNESS ROOM	-	-	8 1/2" X 2"	
38	B3	WALL	-	MEN'S LOCKER ROOM	-	-	8 1/2" X 4"	
39	B1	DOOR	110	-	-	MAINTENANCE DEBRIEF	8 1/2" X 8 1/2"	
40	B2	DOOR	-	CLOSET	-	-	8 1/2" X 2"	
41	B1	WALL	109	-	-	MAINTENANCE INFO CONTROL	8 1/2" X 8 1/2"	
42	B1	WALL	134B	-	-	T.O. LIBRARY	8 1/2" X 8 1/2"	
43	B2	WALL	-	STORAGE ROOM	-	-	8 1/2" X 2"	
44	B1	PANEL	102	-	-	PRODUCTION SUPERVISOR	8 1/2" X 8 1/2"	
45	B1	PANEL	103	-	-	MAINTENANCE OFFICES	8 1/2" X 8 1/2"	
46	B1	DOOR	104	-	-	MAINTENANCE O.I.C.	8 1/2" X 8 1/2"	
47	B1	PANEL	106	-	-	MAINTENANCE SUPERVISOR	8 1/2" X 8 1/2"	
48	B1	PANEL	108	-	-	ELEMENT 'A'	8 1/2" X 8 1/2"	
49	B1	PANEL	107	-	-	ELEMENT 'B'	8 1/2" X 8 1/2"	
50	B1	DOOR	105	-	-	CONFERENCE	8 1/2" X 8 1/2"	
51	B1	WALL	134A	-	-	ISSUE OFFICE		
52	B3	WALL	-	HAZARDOUS MATERIAL STORAGE	-	-	8 1/2" X 4"	
53	B2	WALL	-	UTILITY ROOM	-	-	8 1/2" X 2"	

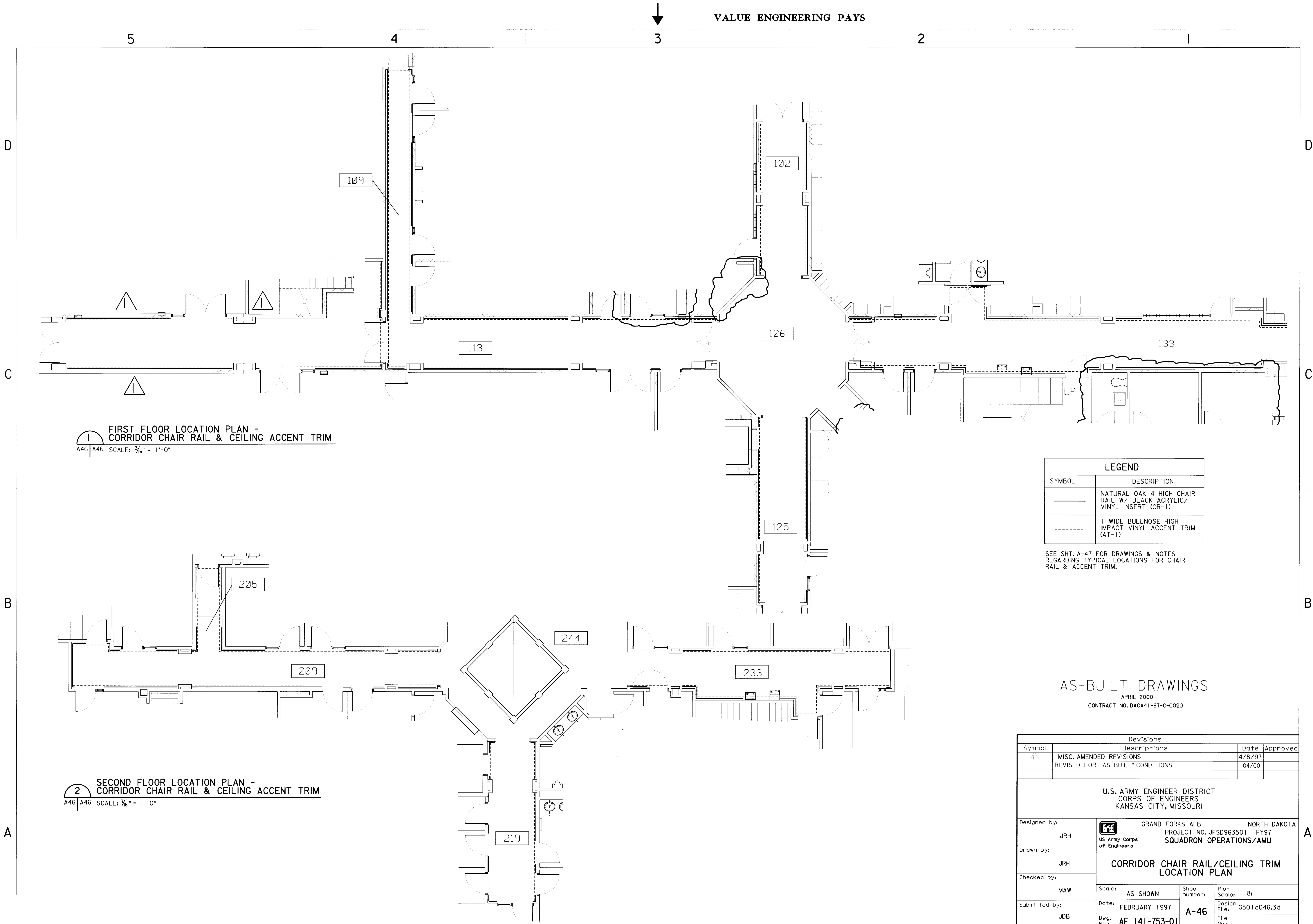
INTERIOR SIGNAGE SCHEDULE - SECOND FLOOR

SIGN NO.	TYPE	MOUNTING SURFACE	PERMANENT GRAPHICS			INSERT GRAPHICS	SIZE (W" x H")	REMARKS
			ROOM NO.	COPY	PICTOGRAPH/SYMBOL			
54	D	WALL	-	ELEVATOR	ELEVATOR	-	8 1/2" X 8 1/2"	
55	B2	DOOR	-	JANITOR	-	-	8 1/2" X 2"	
56	B2	DOOR	-	COMMUNICATIONS	-	-	8 1/2" X 8 1/2"	
57	B1	WALL	216	-	-	OPERATIONS TRAINING	8 1/2" X 8 1/2"	
58	B1	PANEL	215	-	-	TACTICS	8 1/2" X 8 1/2"	
59	B1	WALL	214	-	-	DATA MANAGEMENT	8 1/2" X 8 1/2"	
60	E	DOOR	-	WOMEN	WOMEN/HANDICAP	-	8 1/2" X 8 1/2"	
61	F	WALL	-	NOTICES	SQUADRON EMBLEM	-	77 1/2" X 37"	
62	E	DOOR	-	MEN	MAN/HANDICAP	-	8 1/2" X 2"	
63	B2	DOOR	-	ELECTRICAL	-	-	8 1/2" X 2"	
64	B2	DOOR	-	COMMUNICATIONS	-	-	8 1/2" X 8 1/2"	
65	B1	PANEL	-	-	-	TRAINER CARGO LOAD	8 1/2" X 8 1/2"	
66	B1	PANEL	209	-	-	QUALITY	8 1/2" X 8 1/2"	
67	D	DOOR	-	STAIRS	STAIRS	-	8 1/2" X 8 1/2"	
68	B1	DOOR	212	-	-	LOUNGE	8 1/2" X 8 1/2"	
69	B1	PANEL	213	-	-	ORDERLY ROOM	8 1/2" X 8 1/2"	
70	B1	WALL	207	-	-	SQUADRON OPERATIONS COMMAND SECTION	8 1/2" X 8 1/2"	
71	B1	DOOR	202	-	-	1ST SARGEANT	8 1/2" X 8 1/2"	
72	B1	DOOR	208	-	-	BOOM SUPERVISOR	8 1/2" X 8 1/2"	
73	B1	DOOR	203	-	-	OPERATIONS OFFICER	8 1/2" X 8 1/2"	
74	B1	DOOR	204	-	-	XO	8 1/2" X 8 1/2"	
75	B1	DOOR	205	-	-	COMMANDER	8 1/2" X 8 1/2"	
76	B1	DOOR	206	-	-	CONFERENCE ROOM	8 1/2" X 8 1/2"	
77	F	WALL	-	NOTICES	SQUAD/WING EMBLEMS	-	59" X 37"	
78	B1	DOOR	211	-	-	CENTRAL ADMINISTRATION	8 1/2" X 8 1/2"	
79	B3	WALL	-	PROJECTION ROOM	-	-	8 1/2" X 4"	
80	B1	WALL	201	-	-	BRIEFING ROOM	8 1/2" X 8 1/2"	
81	B1	DOOR	121	-	-	OXYGEN BOTTLE MAINTENANCE	8 1/2" X 8 1/2"	
82	B2	WALL	-	CLASSROOM 'A'	-	-	8 1/2" X 2"	
83	B2	WALL	-	STORAGE	-	-	8 1/2" X 2"	
84	B1	PANEL	217	-	-	FLIGHT GROUND SAFETY	8 1/2" X 8 1/2"	
85	B2	PANEL	-	CLASSROOM 'B'	-	-	8 1/2" X 2"	
86	B1	PANEL	204	-	-	MOBILITY	8 1/2" X 8 1/2"	
87	B1	DOOR	201	-	-	BRIEFING ROOM	8 1/2" X 8 1/2"	
88	B1	PANEL	219	-	-	STANDARDS EVALUATION	8 1/2" X 8 1/2"	
89	D	WALL	-	STAIRS	STAIRS	-		
90	B1	PANEL	220	-	-	FLIGHT COMMAND STAFF	8 1/2" X 8 1/2"	
91	B1	DOOR	221	-	-	TESTING	8 1/2" X 8 1/2"	
92	B1	PANEL	222	-	-	MANUAL CONTROL	8 1/2" X 8 1/2"	
93	B1	PANEL	223	-	-	FLIGHT COMMANDER	8 1/2" X 8 1/2"	
94	B1	PANEL	224	-	-	FLIGHT COMMANDER	8 1/2" X 8 1/2"	
95	B1	PANEL	225	-	-	FLIGHT COMMANDER	8 1/2" X 8 1/2"	
96	B1	PANEL	226	-	-	TRAINING CHIEF		
97	B2	WALL	-	CLASSROOM 'D'	-	-	8 1/2" X 2"	
98	B2	WALL	-	CLASSROOM 'C'	-	-	8 1/2" X 2"	
99	A	WALL	-	OPS COMMAND STAFF ORDERLY ROOM BUDGET MOBILITY LOUNGE	UP ARROW ON HEADER (JUSTIFY LEFT)	-	18" X	
100	A	WALL	-	FLIGHT GROUND SAFETY MOBILITY NCOIC CLASSROOMS STAN/EVAL FLIGHT STAFF/DEBRIEF	UP ARROW ON HEADER (JUSTIFY LEFT)	-	18" X	
101	A	WALL	-	WOMEN TACTICS OPS TRAINING	LEFT ARROW ON HEADER (JUSTIFY LEFT)	-	18" X	
102	B3	WALL	-	PROJECTION ROOM	-	-	8 1/2" X 4"	
103	B1	DOOR	118	-	-	HELMET/CHEMICAL STORAGE/ISSUE	8 1/2" X 8 1/2"	
104	B2	WALL	-	TOOL ISSUE ROOM	-	-	8 1/2" X 2"	

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

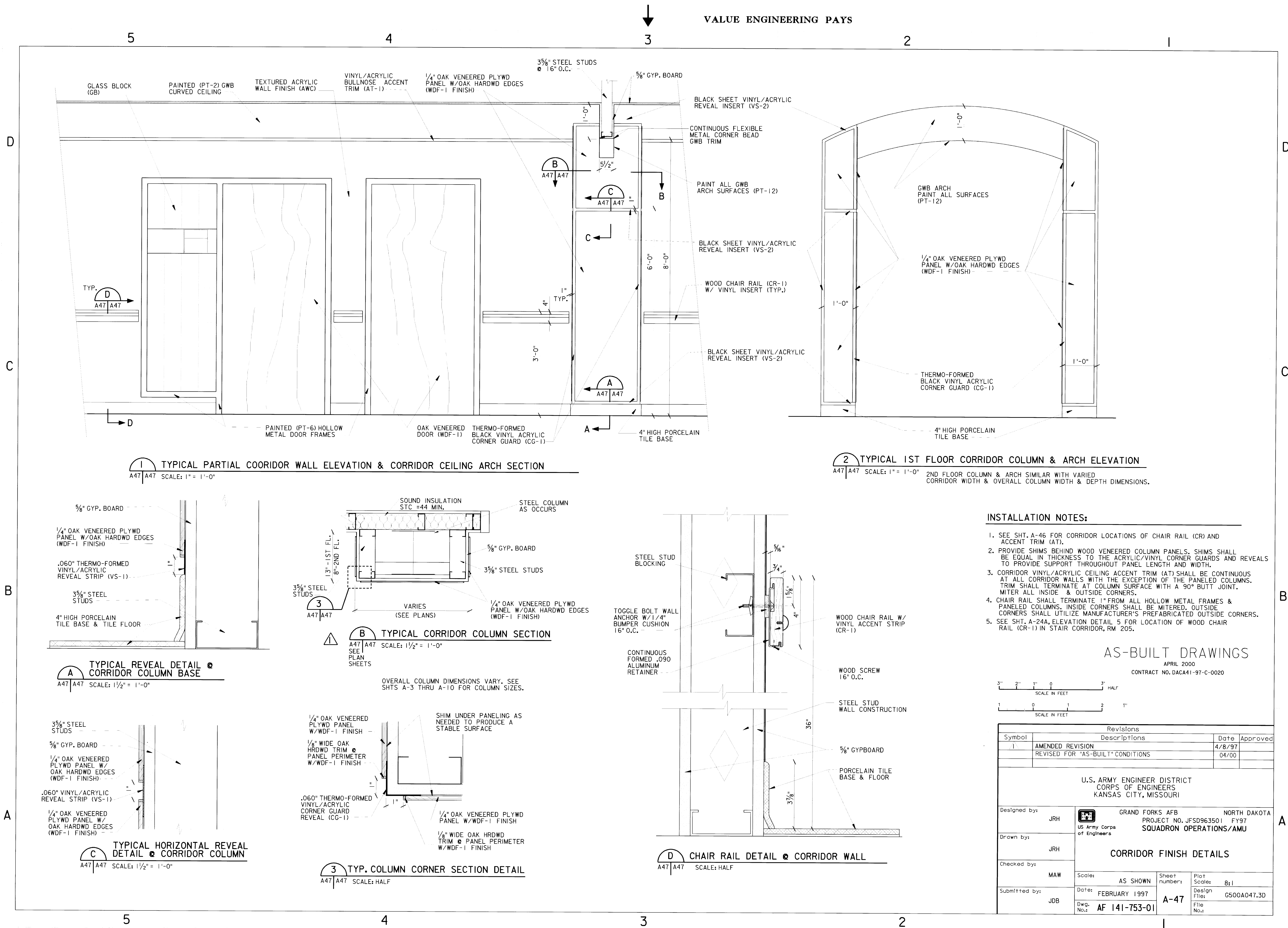
Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	J.G.S.	SIGNAGE/ VISUAL DISPLAY SCHEDULE	
Checked by:	M.A.W.	Scale:	AS SHOWN
Submitted by:	J.D.B.	Date:	FEBRUARY 1997
		Sheet number:	A-45
		Plot Scale:	8:1
		Design File:	g501a045.3d
		Dwg. No.:	AF 141-753-01
		File No.:	



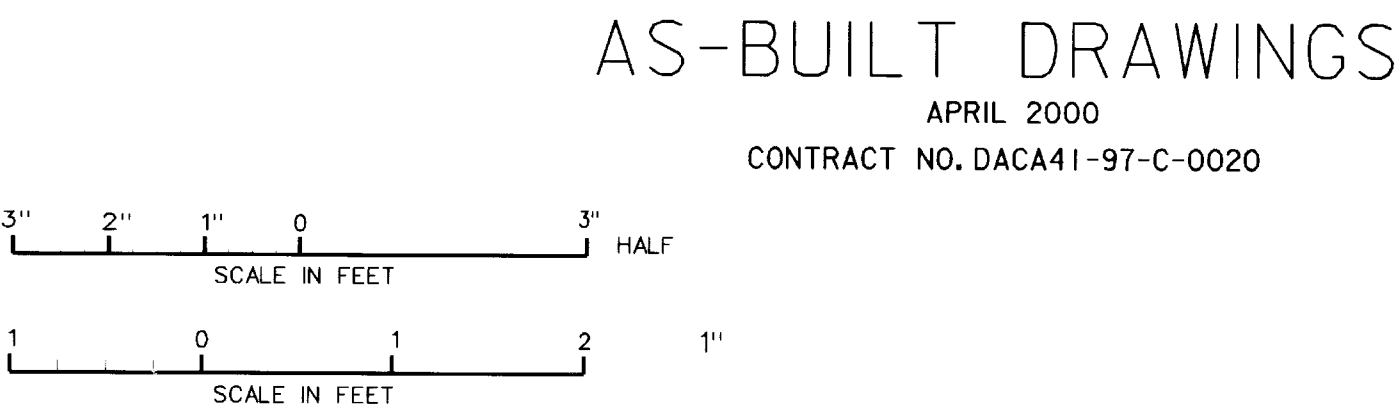
AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
1	MISC. AMENDED REVISIONS	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JRH	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	JRH	CORRIDOR CHAIR RAIL/CEILING TRIM LOCATION PLAN	
Checked by:	MAW		
Submitted by:	JDB	Scale: AS SHOWN	Sheet number: 8:1
		Date: FEBRUARY 1997	Design File: G501a046.3d
		Dwg. No.: AF 141-753-01	File No.: A-46

631-00- 156-80 A-46



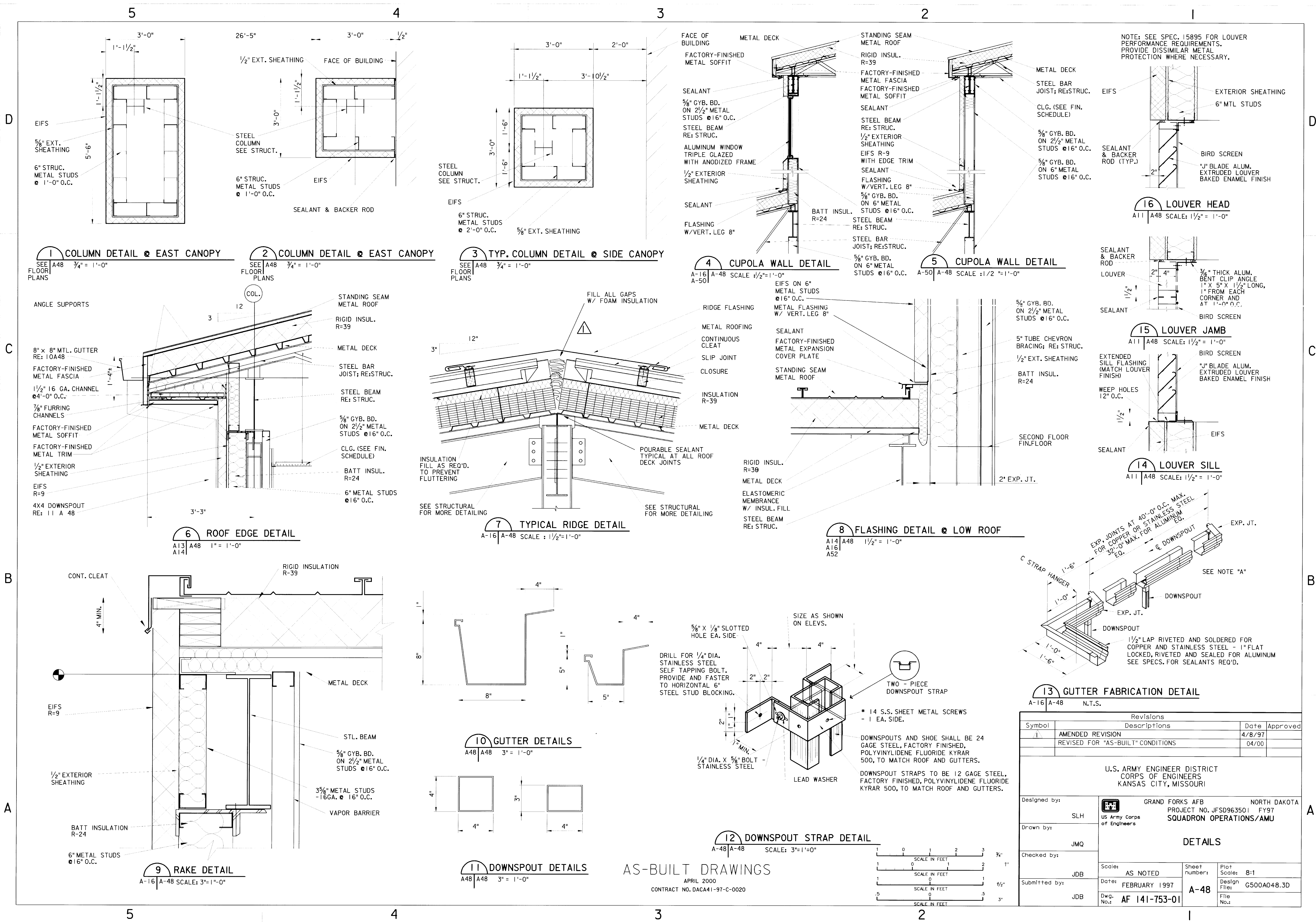
- INSTALLATION NOTES:**
- SEE SHT. A-46 FOR CORRIDOR LOCATIONS OF CHAIR RAIL (CR) AND ACCENT TRIM (AT).
 - PROVIDE SHIMS BEHIND WOOD VENEERED COLUMN PANELS. SHIMS SHALL BE EQUAL IN THICKNESS TO THE ACRYLIC/VINYL CORNER GUARDS AND REVEALS TO PROVIDE SUPPORT THROUGHOUT PANEL LENGTH AND WIDTH.
 - CORRIDOR VINYL/ACRYLIC CEILING ACCENT TRIM (AT) SHALL BE CONTINUOUS AT ALL CORRIDOR WALLS WITH THE EXCEPTION OF THE PANELED COLUMNS. TRIM SHALL TERMINATE AT COLUMN SURFACE WITH A 90° BUTT JOINT. MITER ALL INSIDE & OUTSIDE CORNERS.
 - CHAIR RAIL SHALL TERMINATE 1" FROM ALL HOLLOW METAL FRAMES & PANELED COLUMNS. INSIDE CORNERS SHALL BE MITERED. OUTSIDE CORNERS SHALL UTILIZE MANUFACTURER'S PREFABRICATED OUTSIDE CORNERS.
 - SEE SHT. A-24A, ELEVATION DETAIL 5 FOR LOCATION OF WOOD CHAIR RAIL (CR-1) IN STAIR CORRIDOR, RM 205.



Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

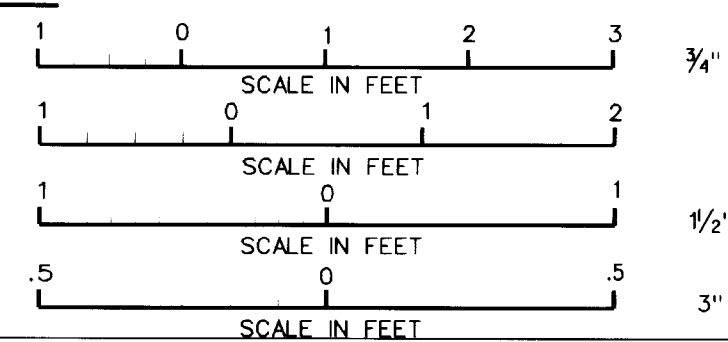
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JRH	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JRH	CORRIDOR FINISH DETAILS	
Checked by:	MAW	Scales: AS SHOWN	Sheet number: 8:1
Submitted by:	JDB	Date: FEBRUARY 1997	Design File: G500A047.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000-156-81 A-47



AS-BUILT DRAWINGS

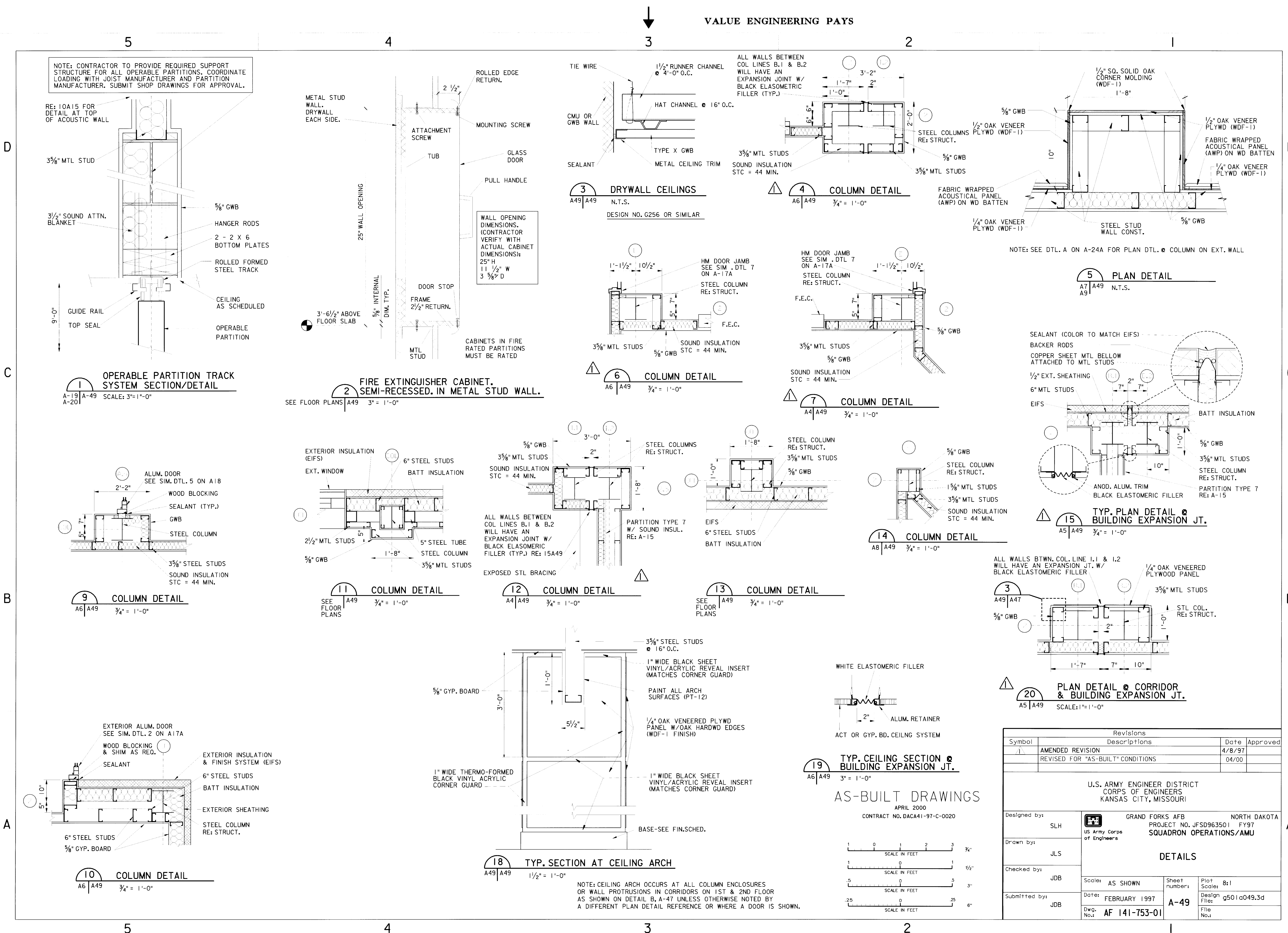
APRIL 2000
CONTRACT NO. DCA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

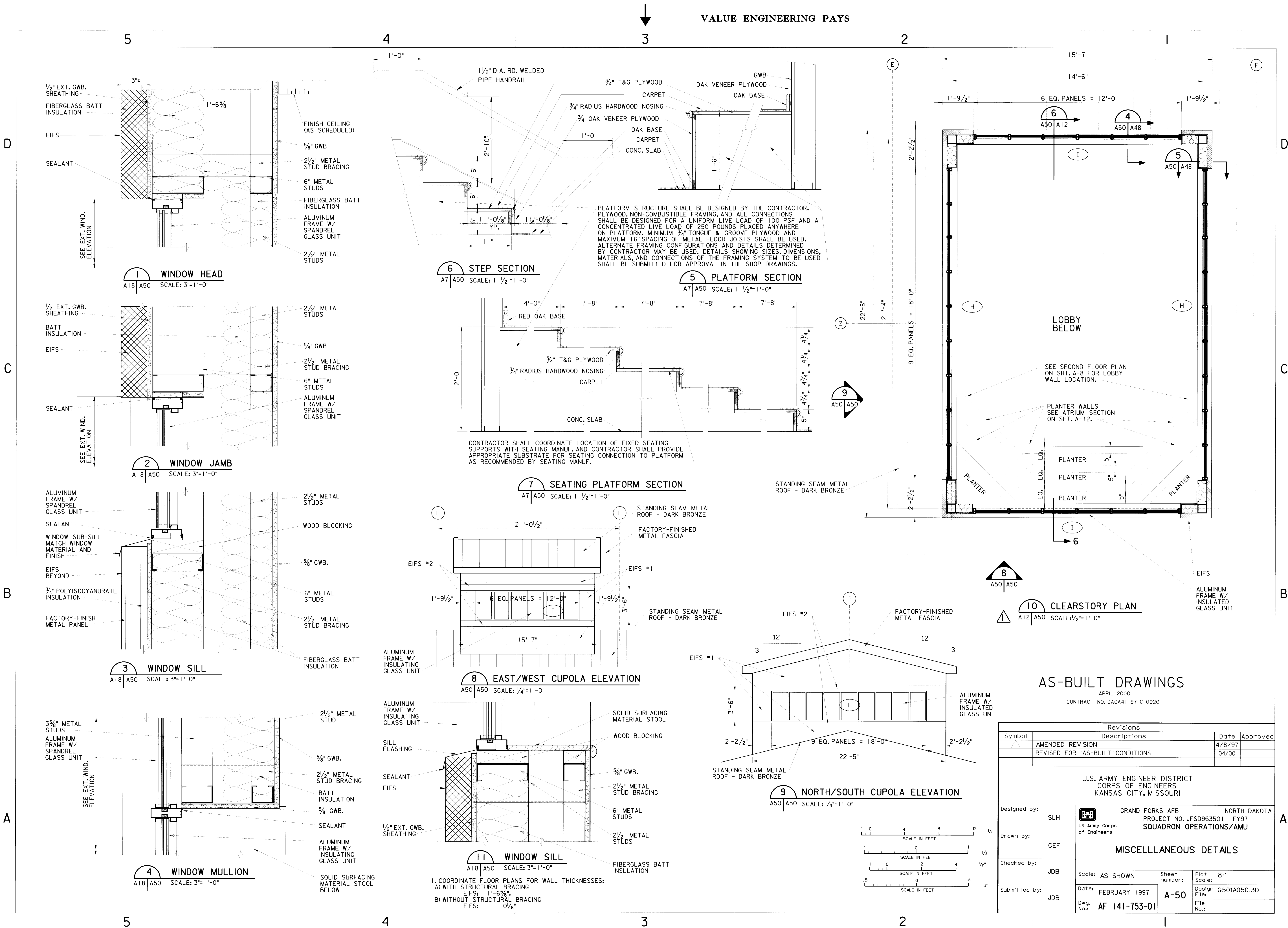
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI		NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Designed by:	SLH	Drawn by:	JMQ
Checked by:	JDB	Submitted by:	JDB
Scale:	AS NOTED	Sheet number:	Plot Scale: 8:1
Date:	FEBRUARY 1997	Design File:	G500A048.3D
Dwg. No.:	AF 141-753-01	File No.:	

631-000-156-82 A-48



631-000-156-83 A-49

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	SLH	Grand Forks AFB North Dakota	
Drawn by:	JLS	PROJECT NO. JFSD963501 FY97	
Checked by:	JDB	SQUADRON OPERATIONS/AMU	
Submitted by:	JDB		
Scale: AS SHOWN		Sheet number:	Plot Scale: 8:1
Date: FEBRUARY 1997		Design File:	g501a049.3d
Dwg. No.: AF 141-753-01		File No.:	
A-49			

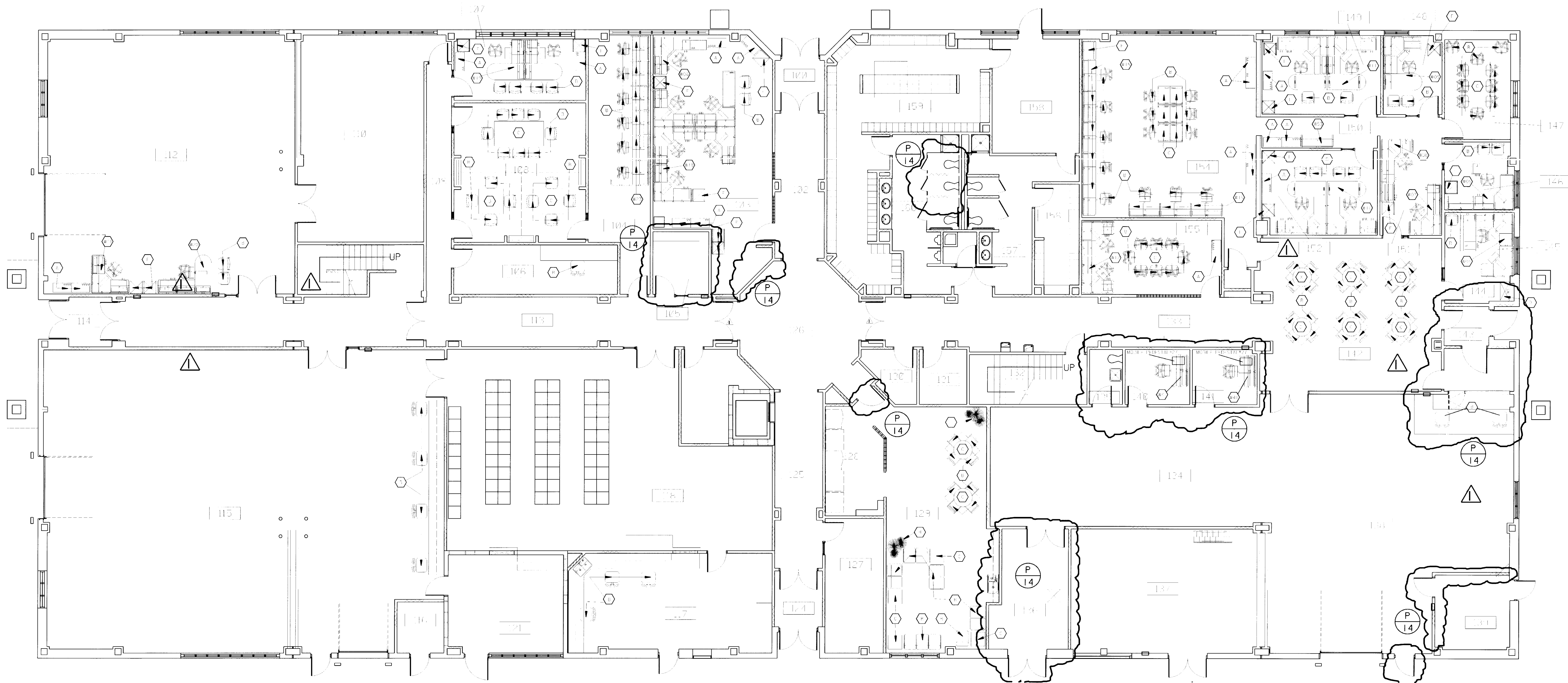


631-000-156-84-A-50





VALUE ENGINEERING PAYS



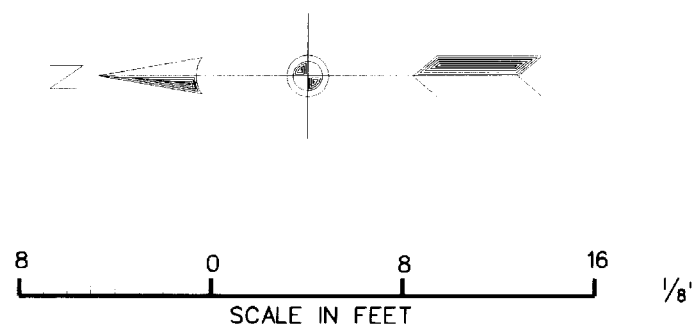
FURNITURE KEY

CODE	DESCRIPTION	SOURCE
A	LATERAL FILE CABINETS	N.J.C. (NOT IN CONTRACT)
B	CHAIRS/SEATING	N.J.C. (NOT IN CONTRACT)
C	TABLES	N.J.C. (NOT IN CONTRACT)
D	STORAGE/SHELVING	N.J.C. (NOT IN CONTRACT)
E	EQUIPMENT (PHOTOCOPIER, ETC.)	N.J.C. (NOT IN CONTRACT)
F	COAT STORAGE KIOSK	N.J.C. (NOT IN CONTRACT)
G	THEATER SEATING	CONTRACTOR SUPPLIED & INSTALLED
H	ARTIFICIAL PLANTS	N.J.C. (NOT IN CONTRACT)
W*	PRE-WIRED WORKSTATION W/SEATING	CONTRACTOR SUPPLIED & INSTALLED

- NOTES:
- SEE SHEETS A-55 & A-56 FOR WORKSTATION CONFIGURATIONS & COMPONENTS.
 - SEE SHEET A-23 FOR WORKSTATION COLORS AND FINISHES.
 - SEE SPECIFICATION SECTION 12640, PREWIRED WORKSTATIONS, FOR FULL WORKSTATION SPECIFICATIONS.
 - TASK CHAIRS FOR EACH WORKSTATION HAVE BEEN INCLUDED AS PART OF THIS CONTRACT IN ACCORDANCE WITH HQ AMC DIRECTIVES AND HQ USAF ETL 90-2.

AS-BUILT DRAWINGS

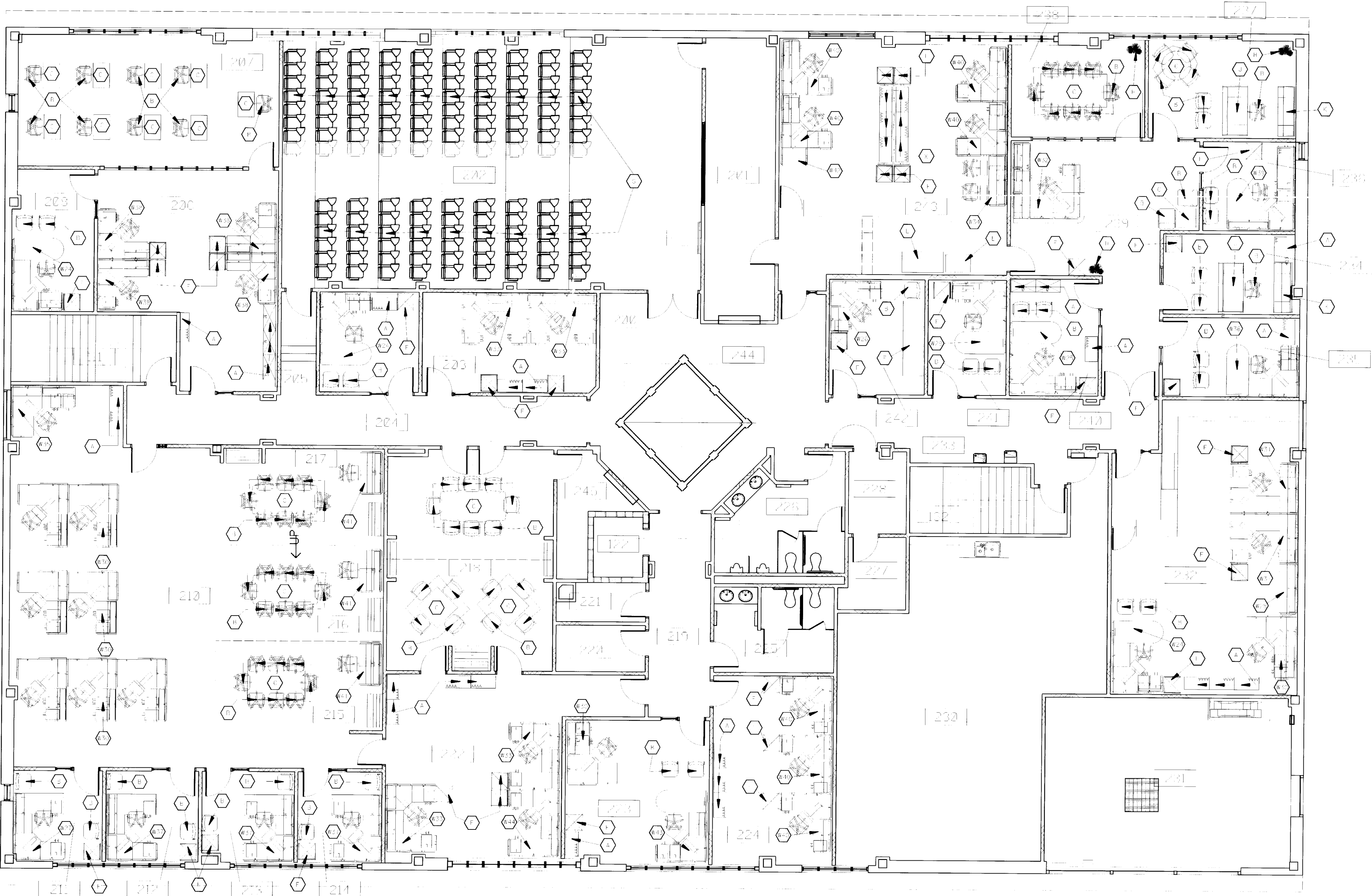
APRIL 2000
CONTRACT NO. DACA41-97-C-0020



Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	J.R.H.	US Army Corps of Engineers	
Checked by:	M.A.W.	FIRST FLOOR FURNITURE PLAN	
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Sheet number: A-53
		Dwg. No.: AF 141-753-01	Plot Scale: 8:1
			Design File: g500a053.3d
			File No.: 14

631-000 156-87 A-53

VALUE ENGINEERING PAYS



FURNITURE KEY

CODE	DESCRIPTION	SOURCE
A	LATERAL FILE CABINETS	N.I.C. (NOT IN CONTRACT)
B	CHAIRS/SEATING	N.I.C. (NOT IN CONTRACT)
C	TABLES	N.I.C. (NOT IN CONTRACT)
D	STORAGE/SHELVING	N.I.C. (NOT IN CONTRACT)
E	EQUIPMENT (PHOTOCOPIER, ETC.)	N.I.C. (NOT IN CONTRACT)
F	COAT STORAGE KIOSK	N.I.C. (NOT IN CONTRACT)
G	THEATER SEATING	CONTRACTOR SUPPLIED & INSTALLED
H	ARTIFICIAL PLANTS	N.I.C. (NOT IN CONTRACT)
W*	PRE-WIRED WORKSTATION W/SEATING	CONTRACTOR SUPPLIED & INSTALLED

NOTES:

- SEE SHEETS A-55 & A-56 FOR WORKSTATION CONFIGURATIONS & COMPONENTS.
- SEE SHEET A-23 FOR WORKSTATION COLORS AND FINISHES.
- SEE SPECIFICATION SECTION 12640, PREWIRED WORKSTATIONS, FOR FULL WORKSTATION SPECIFICATIONS.
- TASK CHAIRS FOR EACH WORKSTATION HAVE BEEN INCLUDED AS PART OF THIS CONTRACT IN ACCORDANCE WITH HQ AMC DIRECTIVES AND HQ USAF ETL 90-2.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	J.R.H.	SECOND FLOOR FURNITURE PLAN	
Checked by:	M.A.W.	Scale: AS SHOWN	Sheet number: A-54
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Plot Scale: 8:1
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			File No.:

634-000 156-88 A-54

5

4

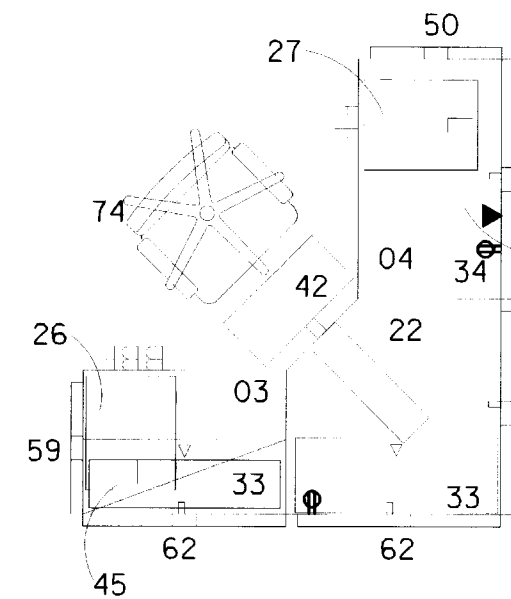
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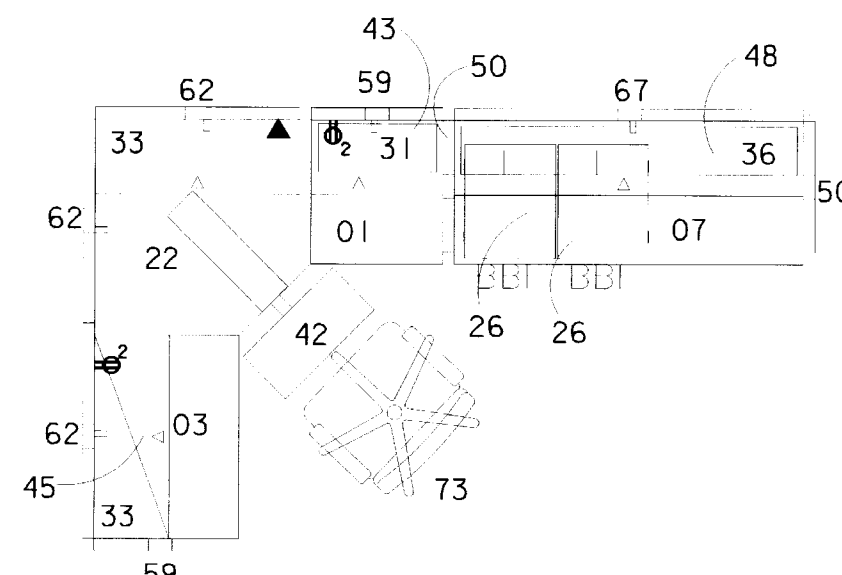
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TYPICAL WORKSTATION
COMPONENT LEGEND

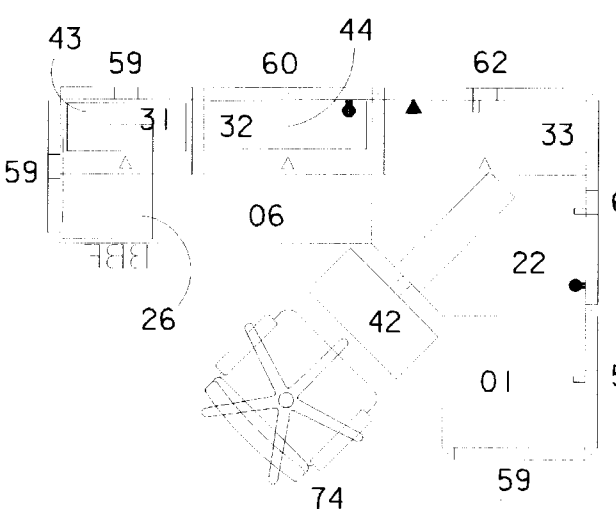
ABBREV.	WORKSURFACES
01	24"D x 24"W STRAIGHT W/GROMMET
02	24"D x 30"W STRAIGHT W/GROMMET
03	24"D x 36"W STRAIGHT W/GROMMET
04	24"D x 42"W STRAIGHT W/GROMMET
05	24"D x 48"W STRAIGHT W/GROMMET
06	24"D x 54"W STRAIGHT W/GROMMET
07	24"D x 60"W STRAIGHT W/GROMMET
08	24"D x 66"W STRAIGHT W/GROMMET
09	24"D x 72"W STRAIGHT W/GROMMET
10	24"D x 84"W STRAIGHT W/GROMMET
11	24"D x 108"W STRAIGHT W/GROMMET
12	18"D x 60"W STRAIGHT W/GROMMET
13	30"D x 30"W STRAIGHT W/GROMMET
14	30"D x 36"W STRAIGHT W/GROMMET
15	30"D x 48"W STRAIGHT W/GROMMET
16	30"D x 60"W STRAIGHT W/GROMMET
17	(NOT USED)
18	30"D x 72"W 'D' SHAPE W/GROMMET
19	30"D x 75"W INTERACTION 'T' LEG TABLE
20	24"D x 36"W INTERACTION 'T' LEG TABLE
21	24"D x 72"W INTERACTION 'T' LEG TABLE
22	24"D x 36"W CORNER UNIT W/GROMMETS
23	42"D x 42"W CORNER UNIT W/GROMMETS
24	24"D x 30"W WOOD UNIT W/GROMMETS
25	30"D x 72"W DOUBLE END PANEL SURFACE
ABBREV.	STORAGE
26	UNDERCOUNTER MOBILE PEDESTAL W/CASTERS (BBF) CONTAINS: (2) BOX DRAWERS (1) FILE DRAWER
27	UNDERCOUNTER MOBILE PEDESTAL W/CASTERS (FF) CONTAINS: (2) FILE DRAWERS
27A	30"W UNDERCOUNTER LATERAL FILE
28	36"W UNDERCOUNTER LATERAL FILE
29	42"W UNDERCOUNTER LATERAL FILE
30	PENCIL DRAWER
31	24"W FLIPPER DOOR UNIT W/SHELF
32	30"W FLIPPER DOOR UNIT W/SHELF
33	36"W FLIPPER DOOR UNIT W/SHELF
34	42"W FLIPPER DOOR UNIT W/SHELF
35	48"W FLIPPER DOOR UNIT W/SHELF
36	60"W FLIPPER DOOR UNIT W/SHELF
37	72"W FLIPPER DOOR UNIT W/SHELF
38	24"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
39	30"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
40	36"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
41	48"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
42	FULLY ARTICULATING KEYBOARD TRAY
ABBREV.	TASK LIGHTING
43	24"W TASK LIGHT
44	30"W TASK LIGHT
45	36"W TASK LIGHT
46	42"W TASK LIGHT
47	48"W TASK LIGHT
48	60"W TASK LIGHT
49	72"W TASK LIGHT
ABBREV.	PRE-WIRED PANELS
50	28"H x 24"W FABRIC COVERED PANEL
51	28"H x 30"W FABRIC COVERED PANEL
52	28"H x 36"W FABRIC COVERED PANEL
53	28"H x 48"W FABRIC COVERED PANEL
54	28"H x 60"W FABRIC COVERED PANEL
55	40"H x 24"W FABRIC COVERED PANEL
56	40"H x 36"W FABRIC COVERED PANEL
57	40"H x 42"W FABRIC COVERED PANEL
58	(NOT USED)
59	65"H x 24"W FABRIC COVERED PANEL
60	65"H x 30"W FABRIC COVERED PANEL
61	65"H x 30"W HALF-GLASS FRAMED FABRIC PANEL
62	65"H x 36"W FABRIC COVERED PANEL
63	65"H x 36"W FABRIC COVERED PANEL W/ PASS-THRU OPENING
64	65"H x 42"W FABRIC COVERED PANEL
65	65"H x 48"W FABRIC COVERED PANEL
66	65"H x 48"W FABRIC COVERED PANEL W/ PASS-THRU OPENING
67	65"H x 60"W FABRIC COVERED PANEL
68	80"H x 24"W FABRIC COVERED PANEL
69	80"H x 30"W FABRIC COVERED PANEL
70	80"H x 36"W FABRIC COVERED PANEL
71	80"H x 60"W FABRIC COVERED PANEL
80	28"H x 42"W FABRIC COVERED PANEL
ABBREV.	SEATING
72	HI-BACK EXECUTIVE ARM CHAIR
73	MANAGEMENT TWO PIECE ARM CHAIR
74	PROFESSIONAL ONE PIECE ARM CHAIR
75	ARMLESS ONE PIECE TASK CHAIR



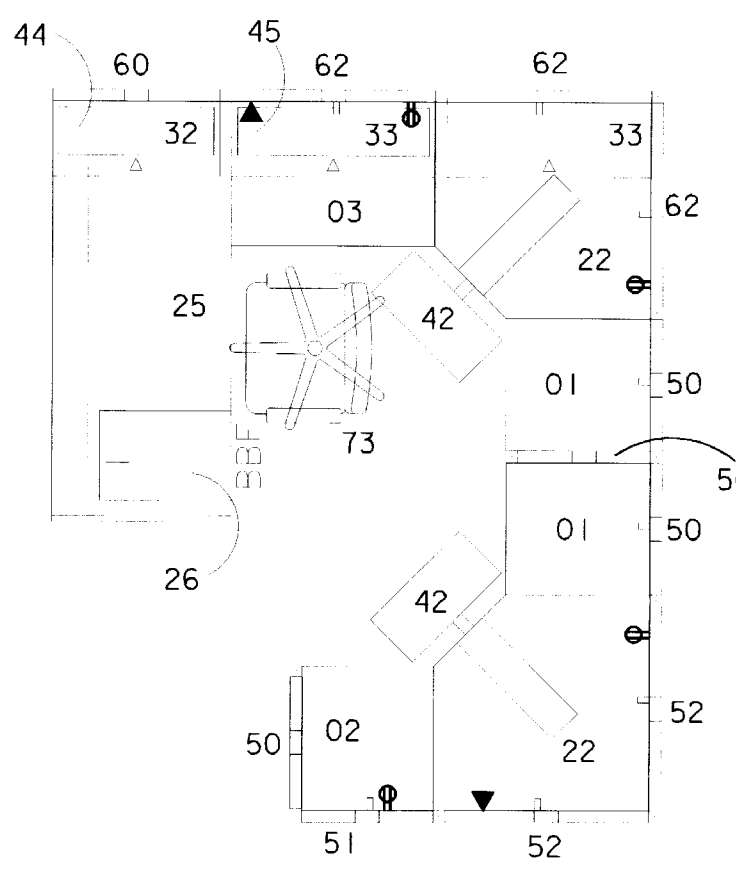
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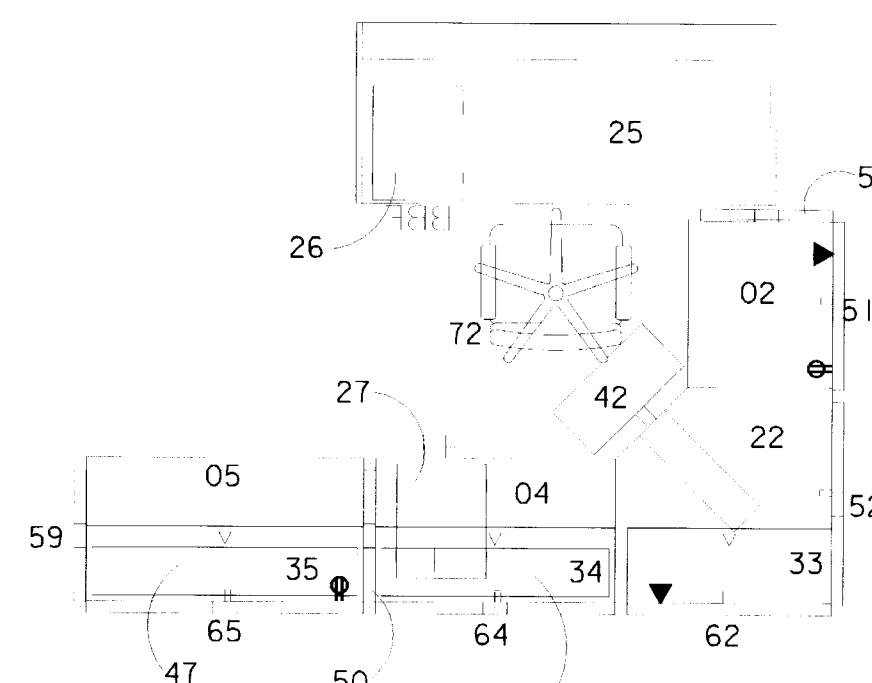
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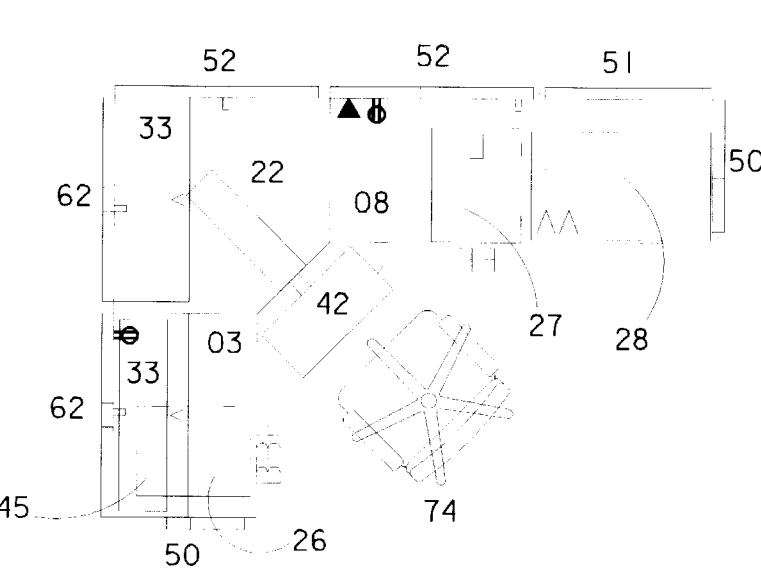
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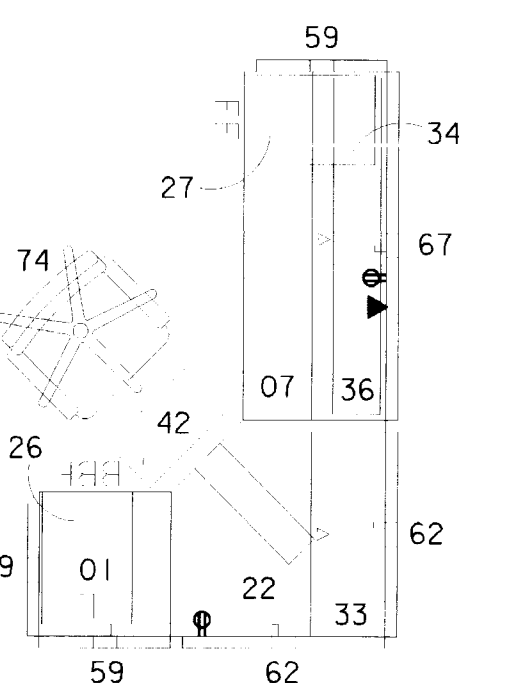
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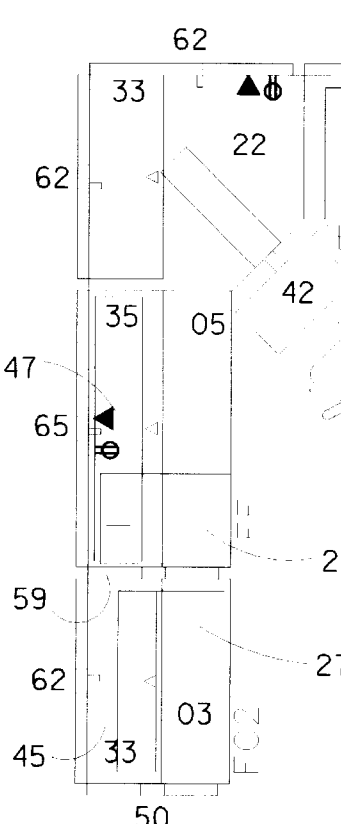
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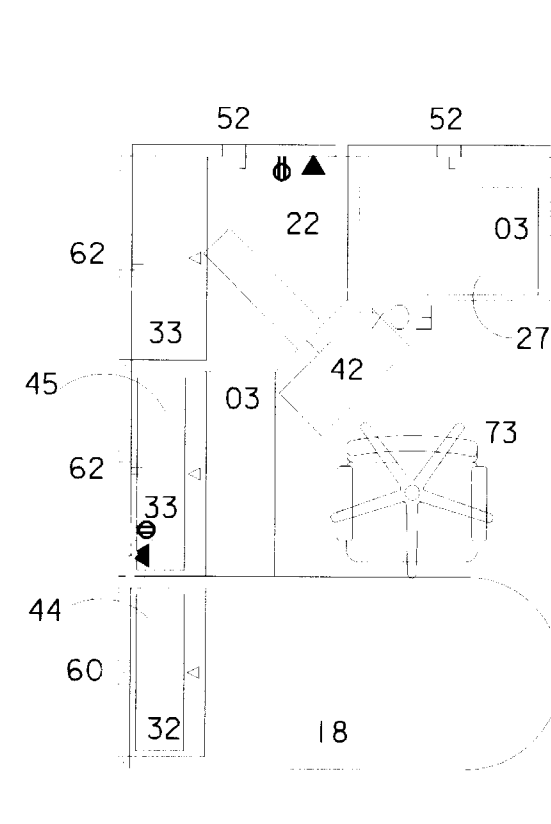
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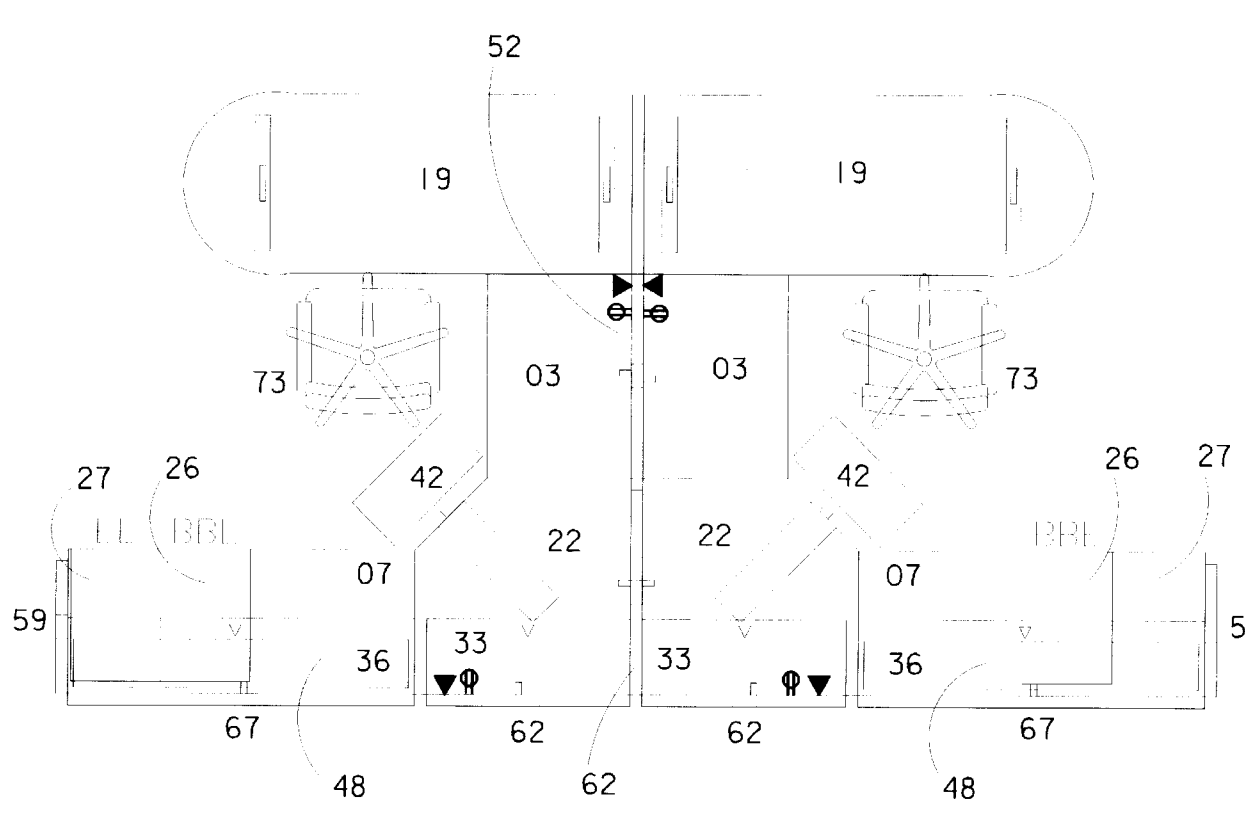
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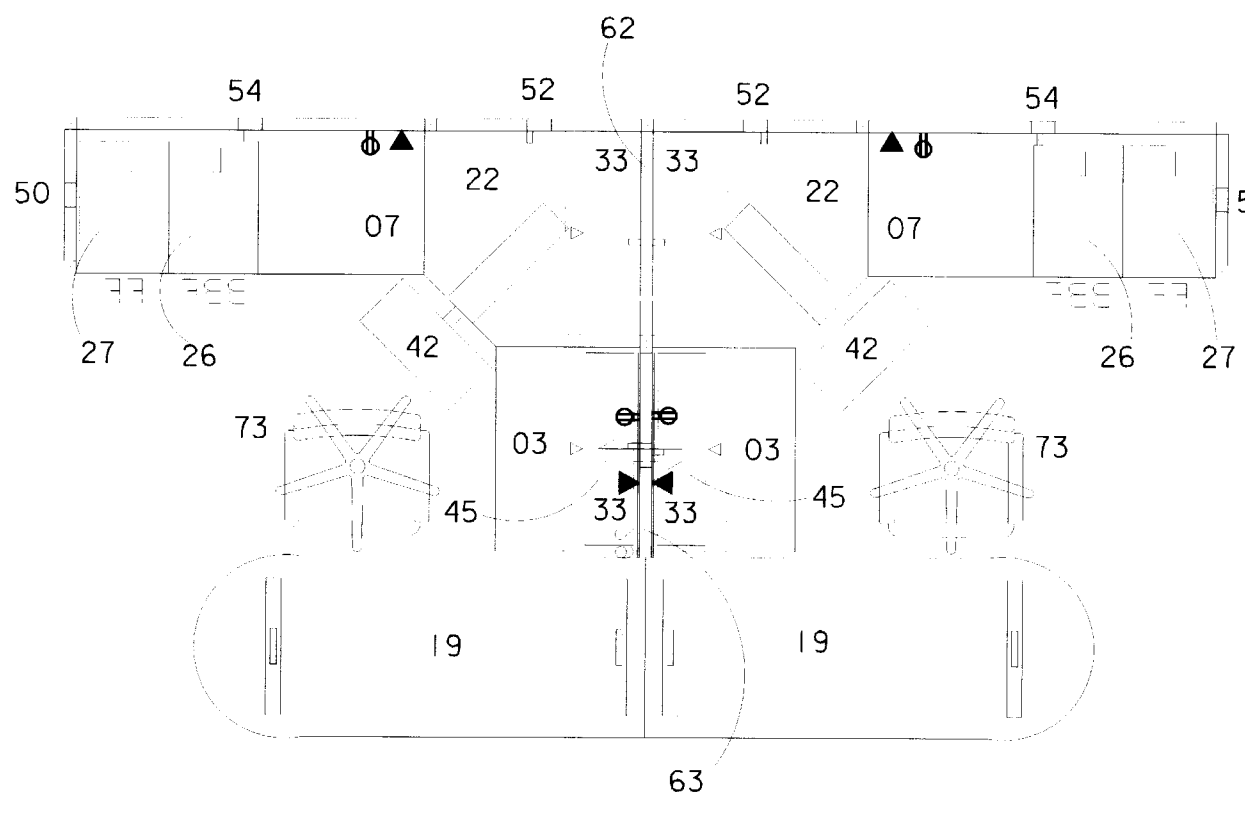
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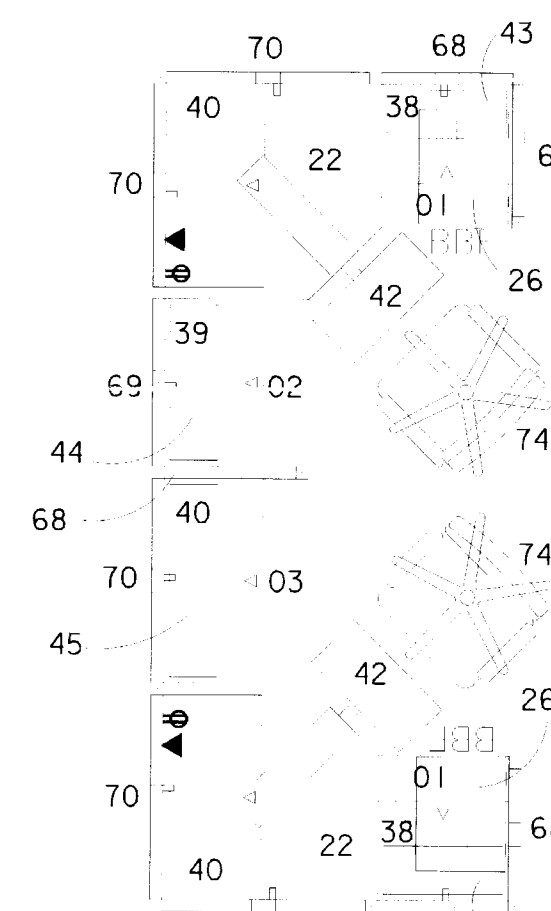
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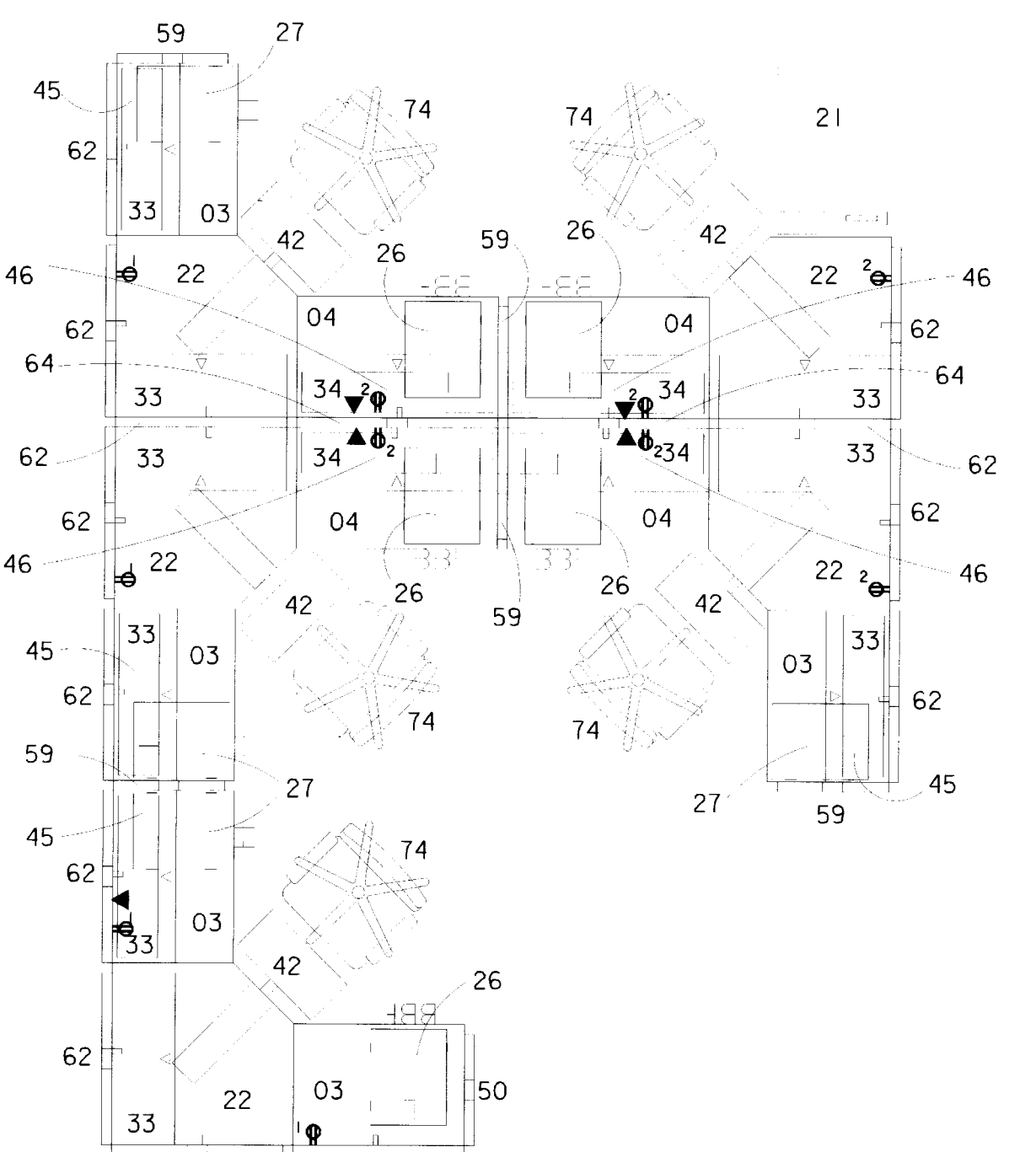
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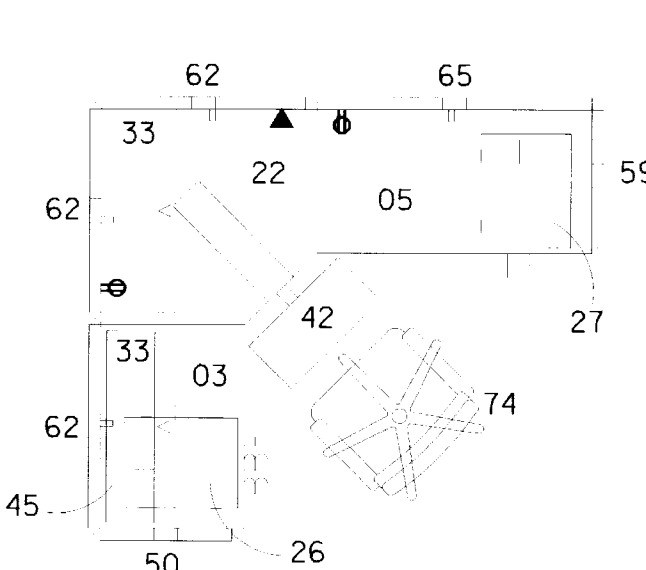
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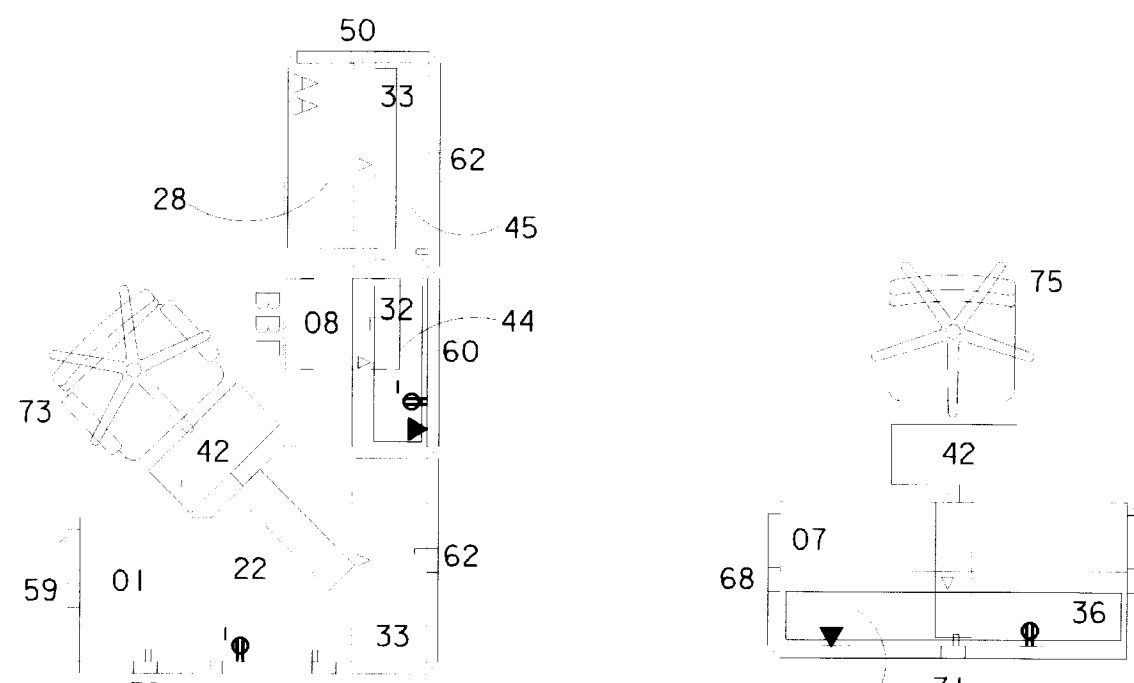
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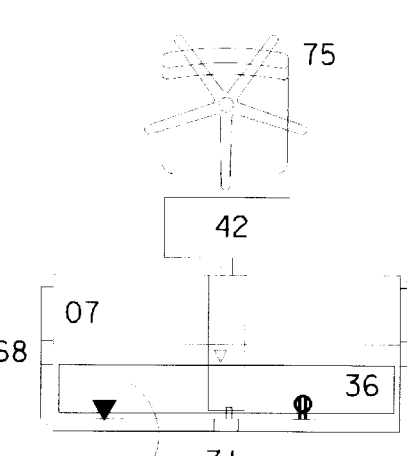
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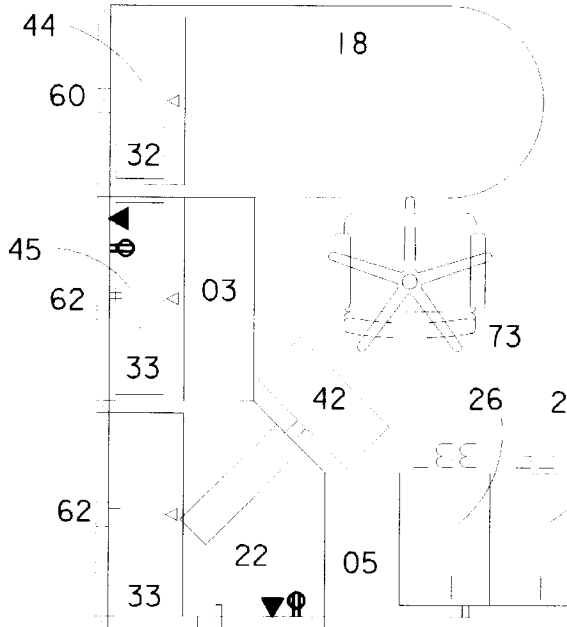
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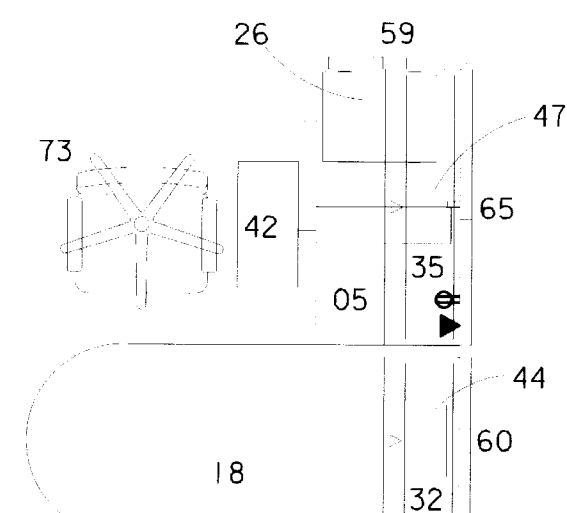
TYPE W14



TYPE W15



TYPE W16

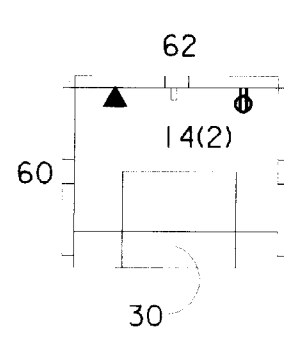


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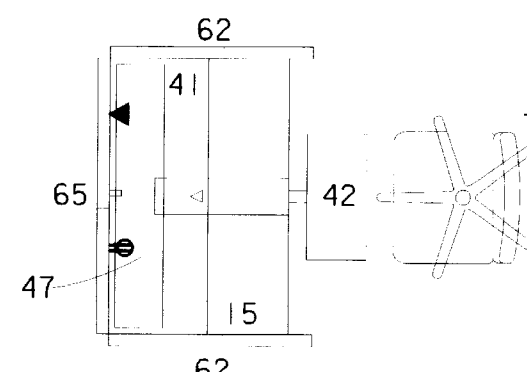
WORKSTATION PANEL BASE ELECTRICAL/COMMUNICATIONS REQUIREMENTS	
SYMBOL	DESCRIPTION
	DUPLEX OUTLET RECEPTACLE TO BE CONNECTED TO POWERED PRE-WIRED WORKSTATION PANELS RECEPTACLE CIRCUIT CONSISTING OF SEPARATE HOTS, A COMMON NEUTRAL, AND A COMMON GROUND. ALL RECEPTACLES SHALL BE WIRED TO ONE CIRCUIT PER WORKSTATION UNLESS OTHERWISE INDICATED ON THIS SHEET WITH A "1" OR "2" INDICATING THE CIRCUIT NUMBER.
	DUPLEX COMMUNICATION PORT TO BE CONNECTED TO COMMUNICATIONS CIRCUIT WITHIN EACH WORKSTATION PANEL BASE. ALL PORTS SHALL BE CATEGORY 5.

WORKSTATION NOTES:

1. THICKNESS FOR ALL WORKSTATION PANELS SHALL BE 1 1/2".
2. SEE SHEET A-23 FOR WORKSTATION COLORS & FINISHES.
3. SEE SHEETS A-53 & A-54 FOR WORKSTATION LOCATIONS.



TYPE W22



TYPE W23

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.	FIRST FLOOR WORKSTATION TYPICALS	
Checked by:	M.A.W.	Scale: 3/8" = 1'-0"	Sheet number: 8:1
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Design File: g501a055.3d
		Dwg. No.: AF 141-753-01	File No.: 8:1

5

4

3

2

1

631-000-156-89 A-55

5

4

3

2

1

TYPICAL WORKSTATION
COMPONENT LEGEND

ABBREV.	WORKSURFACES
01	24"D x 24"W STRAIGHT W/GROMMET
02	24"D x 30"W STRAIGHT W/GROMMET
03	24"D x 36"W STRAIGHT W/GROMMET
04	24"D x 42"W STRAIGHT W/GROMMET
05	24"D x 48"W STRAIGHT W/GROMMET
06	24"D x 54"W STRAIGHT W/GROMMET
07	24"D x 60"W STRAIGHT W/GROMMET
08	24"D x 66"W STRAIGHT W/GROMMET
09	24"D x 72"W STRAIGHT W/GROMMET
10	24"D x 84"W STRAIGHT W/GROMMET
11	24"D x 108"W STRAIGHT W/GROMMET
12	18"D x 60"W STRAIGHT W/GROMMET
13	30"D x 30"W STRAIGHT W/GROMMET
14	30"D x 36"W STRAIGHT W/GROMMET
15	30"D x 48"W STRAIGHT W/GROMMET
16	30"D x 60"W STRAIGHT W/GROMMET
17	(NOT USED)
18	30"D x 72"W 'D' SHAPE W/GROMMET
19	30"D x 75"W INTERACTION 'T' LEG TABLE
20	24"D x 36"W INTERACTION 'T' LEG TABLE
21	24"D x 72"W INTERACTION 'T' LEG TABLE
22	24"D x 36"W CORNER UNIT W/GROMMETS
23	42"D x 42"W CORNER UNIT W/GROMMETS
24	24"D x 30"W WOOD UNIT W/GROMMETS
25	30"D x 72"W DOUBLE END PANEL SURFACE

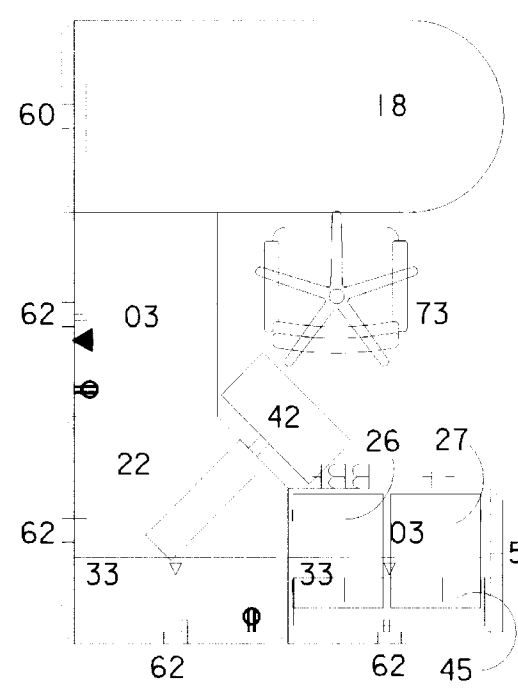
ABBREV.	STORAGE
26	UNDERCOUNTER MOBILE PEDESTAL W/CASTERS (BBF) CONTAINS: (2) BOX DRAWERS (1) FILE DRAWER
27	UNDERCOUNTER MOBILE PEDESTAL W/CASTERS (FF) CONTAINS: (2) FILE DRAWERS
28	36"W UNDERCOUNTER LATERAL FILE
29	42"W UNDERCOUNTER LATERAL FILE
30	PENCIL DRAWER
31	24"W FLIPPER DOOR UNIT W/SHELF
32	30"W FLIPPER DOOR UNIT W/SHELF
33	36"W FLIPPER DOOR UNIT W/SHELF
34	42"W FLIPPER DOOR UNIT W/SHELF
35	48"W FLIPPER DOOR UNIT W/SHELF
36	60"W FLIPPER DOOR UNIT W/SHELF
37	72"W FLIPPER DOOR UNIT W/SHELF
38	24"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
39	30"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
40	36"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
41	48"W EXTRA DEEP FLIPPER DOOR UNIT W/SHELF
42	FULLY ARTICULATING KEYBOARD TRAY

ABBREV.	TASK LIGHTING
43	24"W TASK LIGHT
44	30"W TASK LIGHT
45	36"W TASK LIGHT
46	42"W TASK LIGHT
47	48"W TASK LIGHT
48	60"W TASK LIGHT
49	72"W TASK LIGHT

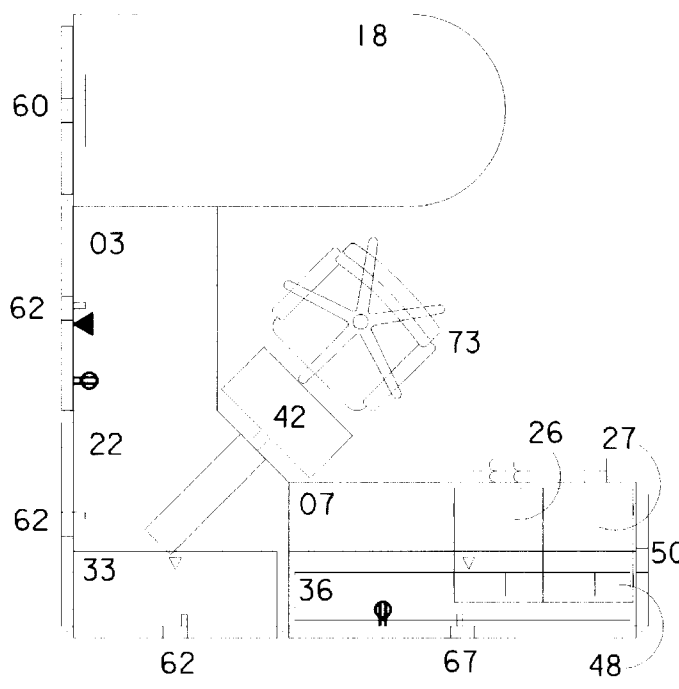
ABBREV.	PRE-WIRED PANELS
50	28"H x 24"W FABRIC COVERED PANEL
51	28"H x 30"W FABRIC COVERED PANEL
52	28"H x 36"W FABRIC COVERED PANEL
53	28"H x 48"W FABRIC COVERED PANEL
54	28"H x 60"W FABRIC COVERED PANEL
55	40"H x 24"W FABRIC COVERED PANEL
56	40"H x 36"W FABRIC COVERED PANEL
57	40"H x 42"W FABRIC COVERED PANEL
58	(NOT USED)
59	65"H x 24"W FABRIC COVERED PANEL
60	65"H x 30"W FABRIC COVERED PANEL
61	65"H x 30"W HALF-GLASS FRAMED FABRIC PANEL
62	65"H x 36"W FABRIC COVERED PANEL
63	65"H x 36"W FABRIC COVERED PANEL W/ PASS-THRU OPENING
64	65"H x 42"W FABRIC COVERED PANEL
65	65"H x 48"W FABRIC COVERED PANEL
66	65"H x 48"W FABRIC COVERED PANEL W/ PASS-THRU OPENING
67	65"H x 60"W FABRIC COVERED PANEL
68	80"H x 24"W FABRIC COVERED PANEL
69	80"H x 30"W FABRIC COVERED PANEL
70	80"H x 36"W FABRIC COVERED PANEL
71	80"H x 60"W FABRIC COVERED PANEL
80	28"H x 42"W FABRIC COVERED PANEL

ABBREV.	SEATING
72	HI-BACK EXECUTIVE ARM CHAIR
73	MANAGEMENT TWO PIECE ARM CHAIR
74	PROFESSIONAL ONE PIECE ARM CHAIR
75	ARMLESS ONE PIECE TASK CHAIR

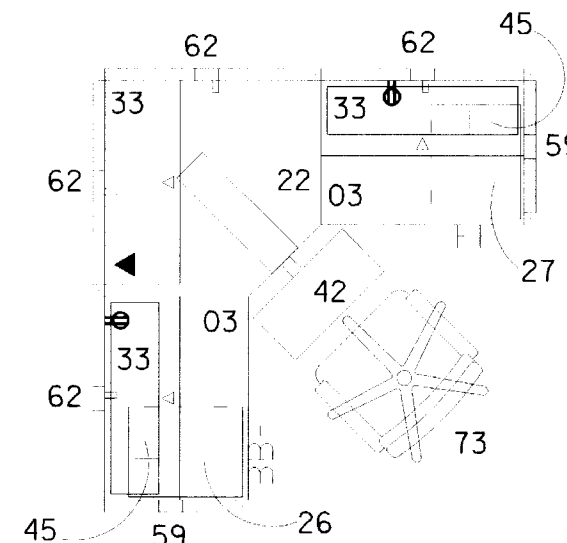
ABBREV.	MISCELLANEOUS
76	42" COUNTER CAP
77	36" x 36" COUNTER CAP
78	60" COUNTER CAP
79	48"W FLIPPER CABINET BACK



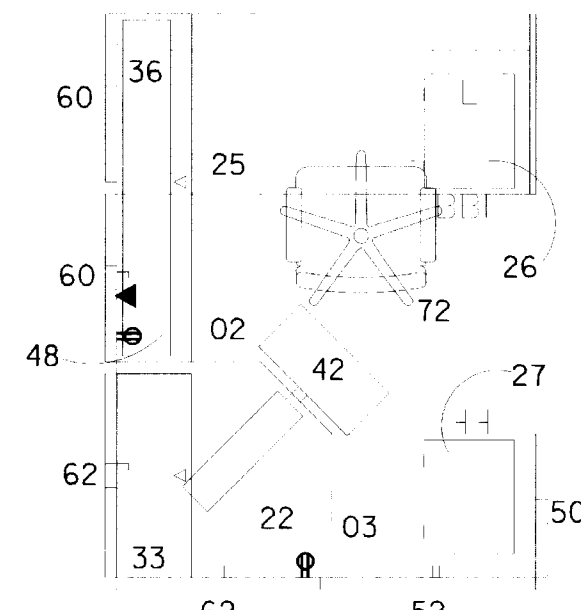
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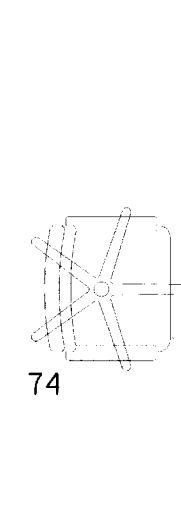
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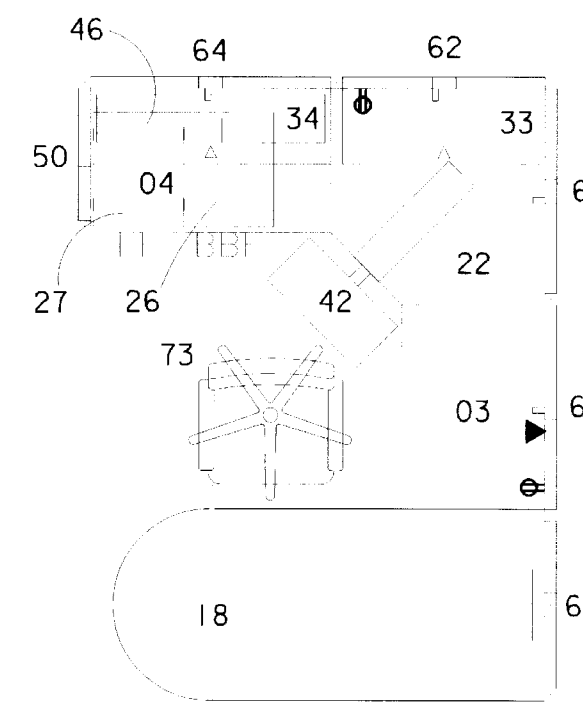
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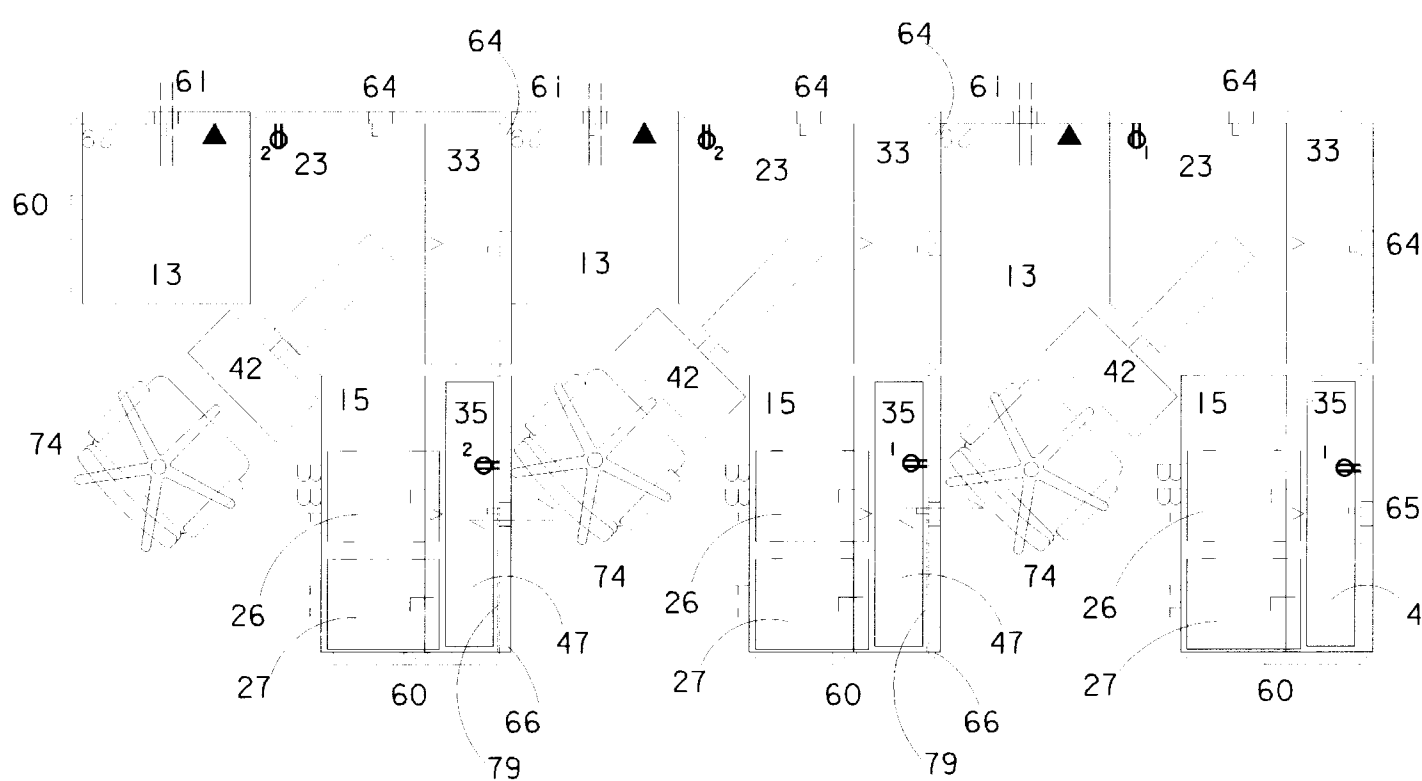
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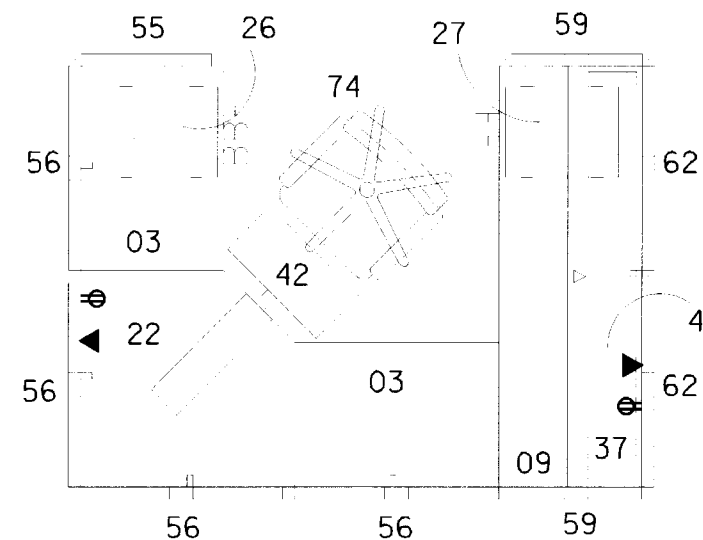
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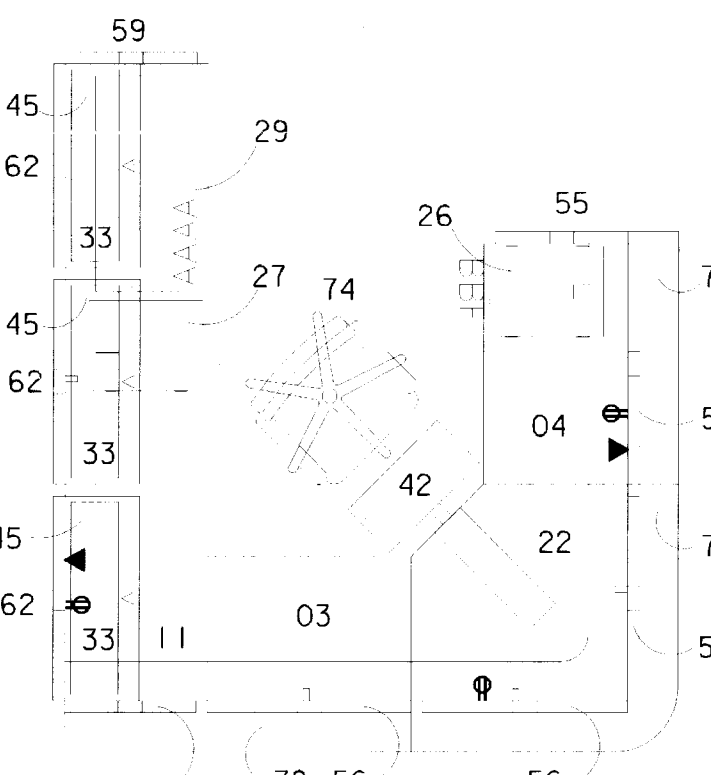
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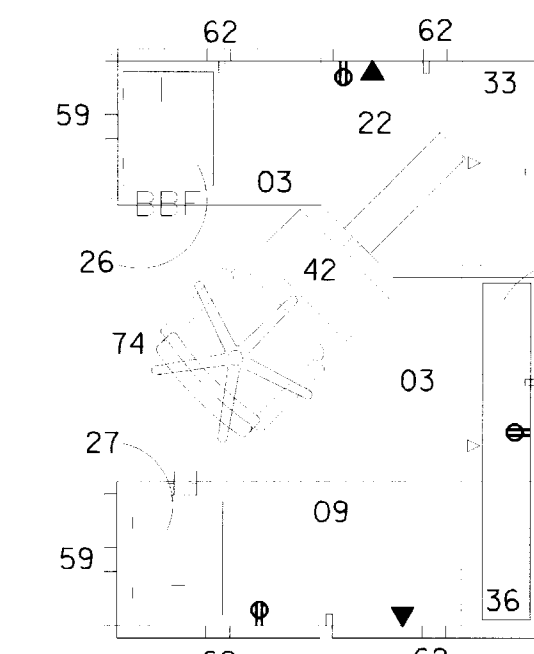
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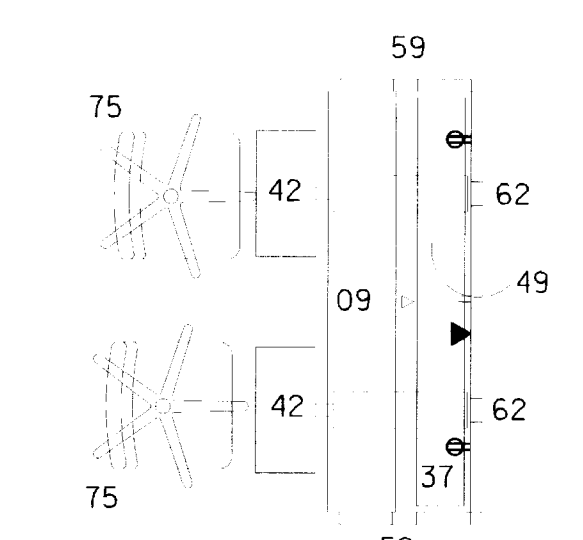
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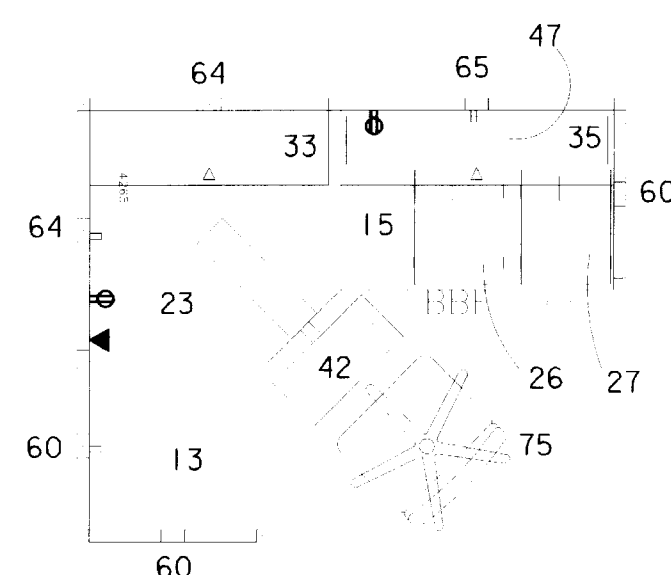
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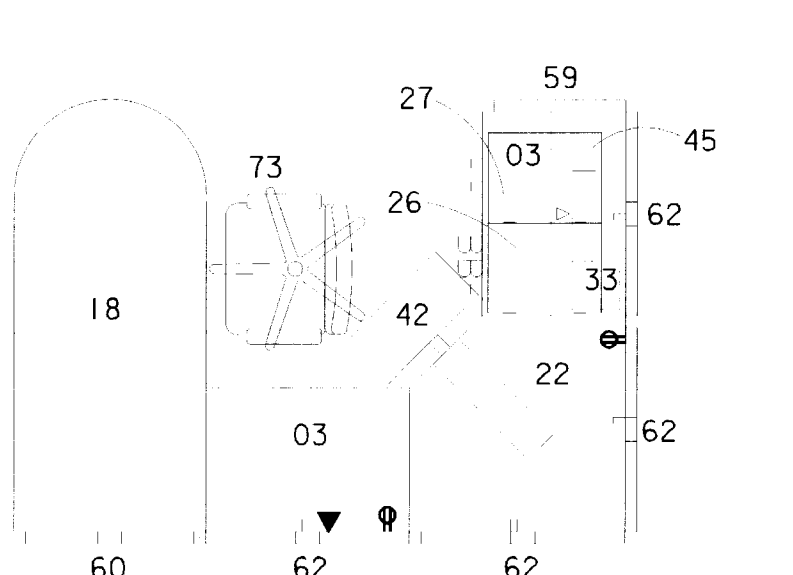
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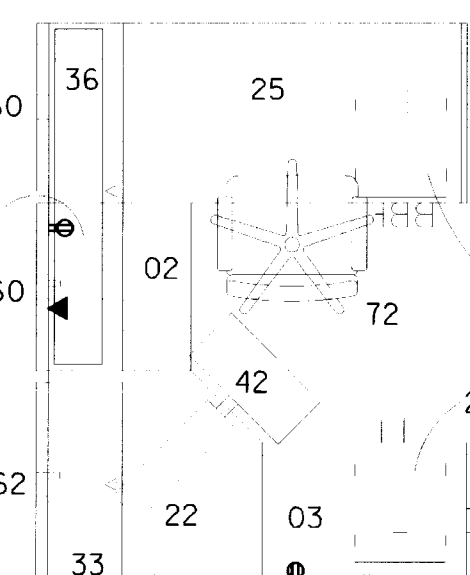
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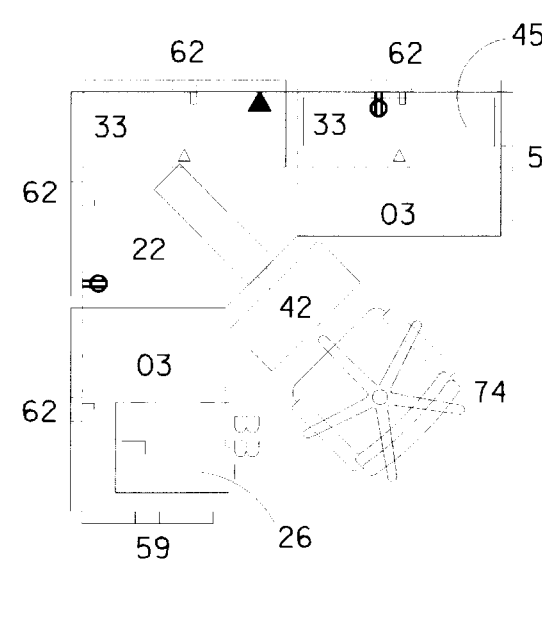
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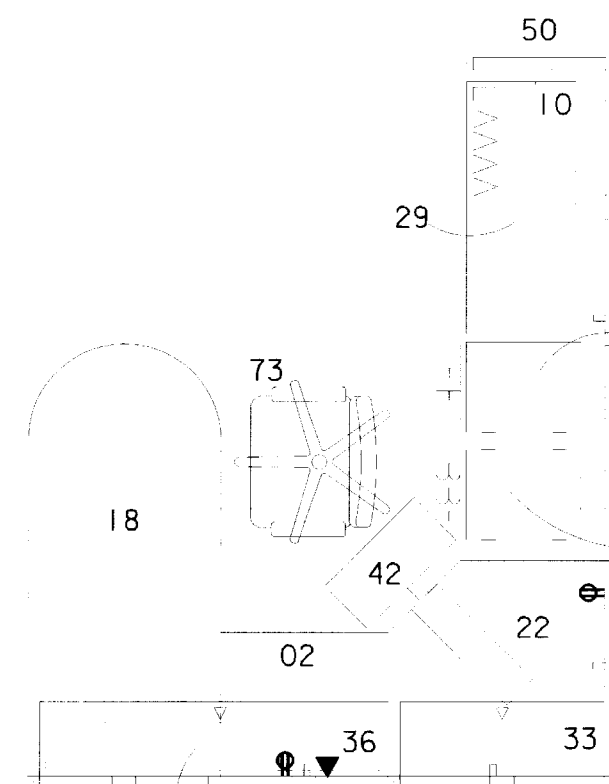
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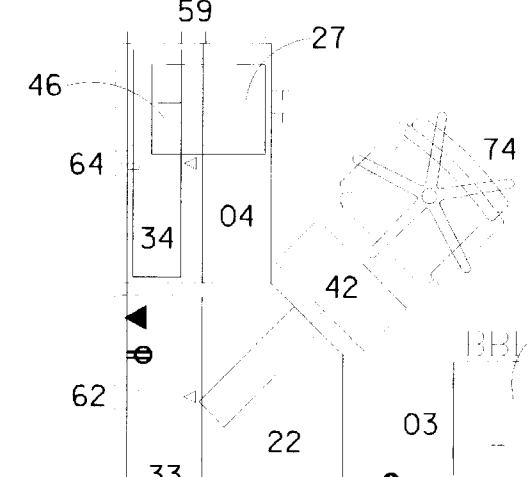
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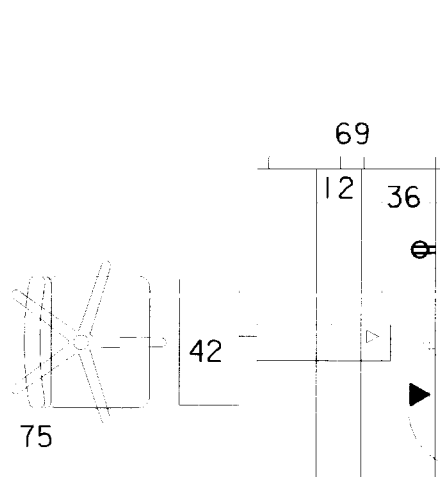
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TYPE W39



TYPE W40

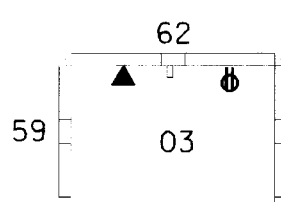


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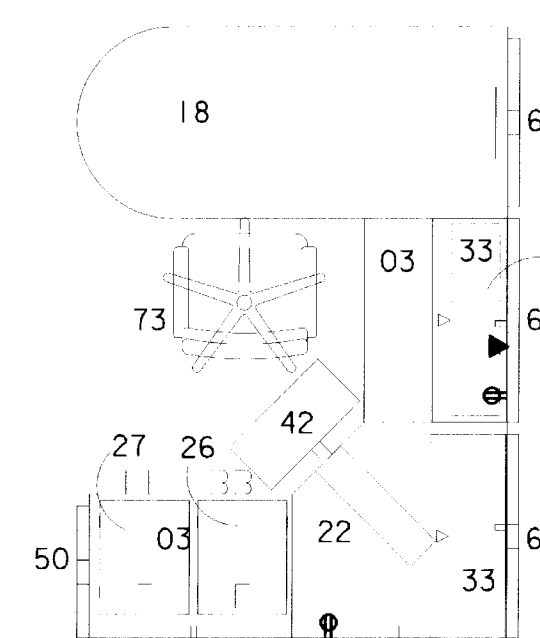
WORKSTATION NOTES:

1. THICKNESS FOR ALL WORKSTATION PANELS SHALL BE 1 1/2".
2. SEE SHEET A-23 FOR WORKSTATION COLORS & FINISHES.
3. SEE SHEETS A-53 & A-54 FOR WORKSTATION LOCATIONS.

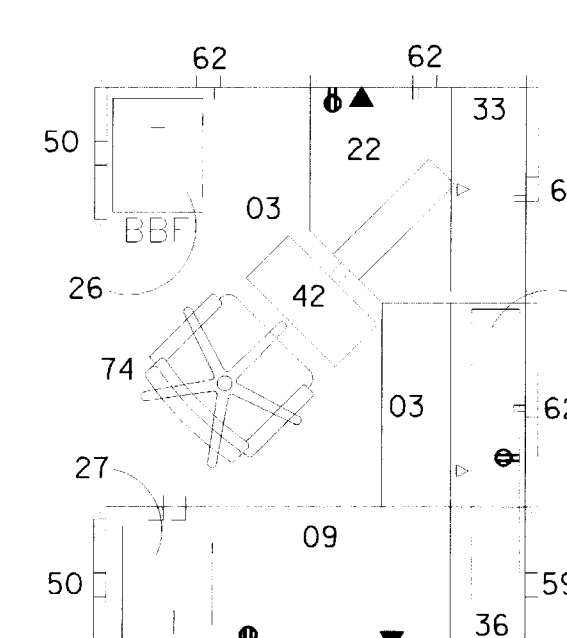
WORKSTATION PANEL BASE ELECTRICAL/COMMUNICATIONS REQUIREMENTS	
SYMBOL	DESCRIPTION
	DUPLEX OUTLET RECEPTACLE TO BE CONNECTED TO POWERED PRE-WIRED WORKSTATION PANELS RECEPTACLE CIRCUIT CONSISTING OF SEPARATE HOTS, A COMMON NEUTRAL, AND A COMMON GROUND. ALL RECEPTACLES SHALL BE WIRED TO ONE CIRCUIT PER WORKSTATION UNLESS OTHERWISE INDICATED ON THIS SHEET WITH A "1" OR "2" INDICATING THE CIRCUIT NUMBER.
	DUPLEX COMMUNICATION PORT TO BE CONNECTED TO COMMUNICATIONS CIRCUIT WITHIN EACH WORKSTATION PANEL BASE. ALL PORTS SHALL BE CATEGORY 5.



TYPE W42



TYPE W43



TYPE W44

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	J.R.H.	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	J.R.H.	SECOND FLOOR WORKSTATION TYPICALS	
Checked by:	M.A.W.	Scale: 3/8" = 1'-0"	Sheet number: A-56 Plot Scale: 8:1 Design File: g501c056.3d File No.:
Submitted by:	J.D.B.	Date: FEBRUARY 1997	Dwg. No.: AF 141-753-01

5

4

3

2

1

631-000-156-90 A-56

GENERAL NOTES:

1. DESIGN LOADS:
GROUND SNOW LOAD ----- 40 PSF
MINIMUM ROOF LIVE LOAD ----- 20 PSF
FOR SNOW DRIFT LOAD AND SLIDING SNOW SEE THIS SHEET
FLOOR LIVE LOADS:
PROJECTION ROOM AND LOBBY----- 100 PSF
MECHANICAL ROOM ----- 125 PSF
OFFICES ----- 50 PSF
STORAGE ROOMS ----- 125 PSF
CORRIDORS ----- 100 PSF
LANDINGS ----- 100 PSF
STAIR TREADS ----- 100 PSF, UNIFORM LOAD OR A 300 LB
CONCENTRATED LOAD OVER 4 SQ. IN PLACED IN A POSITION TO CAUSE MAXIMUM STRESS.
WIND LOADS ----- PER TM 5-809-1 CHAPTER 5 FOR BASIC WIND SPEED OF
80 MPH, EXPOSURE "C", I=1.0
SEISMIC LOAD IN ACCORDANCE WITH TM 5-809-10, ZONE 0
2. SPREAD FOOTINGS ARE DESIGNED TO BEAR ON VIRGIN SOIL WITH A MAXIMUM NET BEARING
PRESSURE OF 1,200 PSF FOR CONTINUOUS AND COLUMN FOOTINGS
AS PER CORP OF ENGINEER'S GEOTECHNICAL SOILS REPORT.
FOR THE SUBGRADE PREPARATION UNDER SLAB ON GRADE, REFER TO DIVISION (2) OF SPECIFICATIONS.
3. STRUCTURAL DRAWINGS ARE INTENDED TO BE USED IN CONJUNCTION WITH ARCHITECTURAL,
MECHANICAL AND ELECTRICAL DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION
OF SHOP DRAWINGS AND WORK.
4. THE CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS PRIOR TO CONSTRUCTION AND
NOTIFY THE CONTRACTING OFFICER OF ANY DISCREPANCIES, INCONSISTENCIES OR DIFFICULTIES
AFFECTING THE WORK BEFORE PROCEEDING.
5. ASSUMED FINISHED FLOOR ELEVATION 100'-0"
6. THE BUILDING IS NOT CONSIDERED STABLE UNTIL THE 1 1/2" DEEP METAL ROOF DECKING INSTALLATION IS
COMPLETE, INCLUDING ALL ATTACHMENTS TO THE BUILDING FRAME AND UNTIL ALL THE BAYS ARE BRACED
AS SHOWN. DURING CONSTRUCTION THE CONTRACTOR SHOULD PROVIDE ADEQUATE TEMPORARY BRACING FOR
THE STRUCTURAL STEEL FRAMING TO HANDLE BOTH HORIZONTAL OR VERTICAL LOADS.
7. GROUT SHALL BE PLACED UNDER THE COLUMN BASE PLATES AS SOON AS PRACTICABLE AND BEFORE
ANY APPRECIABLE LOAD IS APPLIED TO THE COLUMNS TO PRECLUDE ANY UNDUE STRESSES WHICH MAY ACT
ON THE ANCHOR BOLTS.

NORMAL WEIGHT CONCRETE

1. UNLESS NOTED OTHERWISE, ALL CONCRETE SHALL DEVELOP A MINIMUM ULTIMATE
COMPRESSIVE DESIGN STRENGTH OF 4,000 PSI AT 28 DAYS, NOT LESS THAN 564 LBS OF
CEMENT SHALL BE USED PER CUBIC YARD OF CONCRETE REGARDLESS OF STRENGTHS OBTAINED.
ALL CONCRETE EXPOSED TO FREEZING AND THAWING SHALL BE AIR-ENTRAINED (6% ± 1%).
2. REINFORCING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615, GRADE 60. WELDED
WIRE FABRIC SHALL BE IN ACCORDANCE WITH ASTM A185-70.
UNLESS NOTED OTHERWISE, LAP SPLICES, OR EMBEDMENT LENGTHS SHALL
CONFORM TO ACI 318-89.
3. CLEAR COVER FOR REINFORCEMENT OF CONCRETE CAST AGAINST EARTH AND PERMANENTLY
EXPOSED TO EARTH SHALL BE 3". CLEAR COVER FOR ALL OTHER REINFORCEMENT SHALL BE
1 1/2" UNLESS NOTED OTHERWISE.
4. REINFORCEMENT, DETAILING AND PLACEMENT OF CONCRETE SHALL CONFORM TO ACI 318-89
AND ACI 315-80.
5. CALCIUM CHLORIDE SHALL NOT BE ADDED TO ANY CONCRETE.
6. ALL CONCRETE OPERATIONS INCLUDING, BUT NOT LIMITED TO MIX DESIGN,
MIXING, TRANSPORTING, PLACING REINFORCING, DETAILING AND PLACING,
CURING AND TESTING, UNLESS OTHERWISE SHOWN IN THE SPECIFICATION,
SHALL BE DONE IN ACCORDANCE WITH THE PROVISIONS OF APPLICABLE
RECOMMENDATIONS OF THE ACI MANUAL OF STANDARD PRACTICE.
7. SUBSTITUTION OF EXPANSION ANCHORS FOR EMBEDDED ANCHORS SHOWN ON
DRAWINGS WILL NOT BE PERMITTED.
8. BARS MARKED CONTINUOUS AND ALL VERTICALS SHALL BE LAPPED OR EMBEDDED
TO DEVELOP THE FULL TENSILE CAPACITY OF THE BAR. MINIMUM LAPS SHALL
BE CLASS "B" UNLESS OTHERWISE NOTED (U.N.O.).
9. 6X6-W4.0XW4.0 WELDED WIRE FABRIC REINFORCING SHALL BE LOCATED AT 1 1/2" FROM THE
TOP OF SLAB FOR SLAB ON GRADE.
10. UNLESS NOTED OTHERWISE, IN CORNERS OF STRIP FOOTINGS AND WALLS, PROVIDE
CORNER "L" BAR REINFORCEMENT (LAPPED 2 FEET IN EACH DIRECTION) IN BOTH
FACES MATCHING SIZE AND SPACING OF HORIZONTAL REINFORCEMENT.
11. SEE ARCHITECTURAL PLANS FOR LOCATION DETAILS OF ANY RECESS IN SLAB
ON GRADE. MAINTAIN MIN. DEPTH OF SLAB THROUGHOUT THE WHOLE AREA.
12. MASONRY DOWELS INTO CONCRETE FOOTINGS SHALL BE LOCATED TO MATCH
WITH HOLLOW MASONRY BLOCK CELL. THERE SHALL BE A FOUNDATION
DOWEL FOR EACH VERTICAL MASONRY WALL REINFORCEMENT. DOWEL
LAPPED WITH THE VERTICAL REINFORCEMENT IN THE SAME GROUTED CELL.
13. COORDINATE LOCATION AND SIZE OF FLOOR DRAINS WITH MECHANICAL DRAWINGS.
COORDINATE LOCATION AND SIZE OF ELECTRICAL AND MECHANICAL CONDUIT
PENETRATIONS THROUGH SLAB WITH ELECTRICAL AND MECHANICAL DRAWINGS.
14. BUILDING SLABS ON GRADE EXCEPT AT DOORS, SHALL BE ISOLATED FROM
BUILDING FOUNDATION WALLS WITH 1/2" EXP JOINT MATERIAL. OTHER APPROVED JOINT
FILLERS MAY BE USED IF A WIDER JOINT IS REQUIRED TO ENSURE
THE SLAB IS ISOLATED.
15. WELDING OF ALL REINFORCEMENT SHALL COMPLY WITH AWS D1.4.

STRUCTURAL STEEL AND MISC. STEEL

1. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 EXCEPT FOR TUBE AND PIPE SHAPES WHICH
SHALL CONFORM TO ASTM A500, GRADE B.
2. STRUCTURAL STEEL SHALL BE DESIGNED IN ACCORDANCE WITH THE NINTH EDITION OF THE
AISC MANUAL OF STEEL CONSTRUCTION - ALLOWABLE STRESS DESIGN, THE SPECIFICATION
FOR STRUCTURAL STEEL BUILDINGS - ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN
JUNE 1, 1989, AND THE CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
3. BOLTS SHALL BE 3/4" DIAMETER A-490 TYPE N WITH HEX HEADS, UNLESS OTHERWISE NOTED
ON PLANS. CONNECTIONS SHALL HAVE A MINIMUM OF TWO 3/4" DIAMETER BOLTS.
4. ALL STRUCTURAL STEEL WELDING IN THE SHOP OR FIELD SHALL BE PERFORMED BY A QUALI-
FIED WELDER PER THE CURRENT REQUIREMENTS OF THE AMERICAN WELDING SOCIETY (A.W.S.).
USE E70XX ELECTRODES FOR WELDING OPERATIONS.
5. ALL ANCHOR BOLTS SHALL BE ASTM A307.
6. SHOP WELDED AND FIELD BOLTED CONNECTIONS ARE PREFERRED, UNLESS SHOWN OTHERWISE.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF SUPPORT FRAMING
FOR THE SUSPENDED OPERABLE WALL PANELS SHOWN ON THE ARCHITECTURAL DRAWINGS..

LIGHTWEIGHT CONCRETE FOR SECOND FLOOR SLAB

1. THE UNIT WEIGHT OF ALL LIGHTWEIGHT CONCRETE SHALL NOT EXCEED 100 PCF.
2. THE LIGHTWEIGHT CONCRETE FILL SHALL BE REINFORCED WITH 6X6-W2.0XW2.0 WELDED WIRE
FABRIC REINFORCEMENT PLACED 1/2" FROM THE TOP OF SLAB.

REINFORCED CONCRETE MASONRY

1. MASONRY BLOCKS SHALL BE LIGHT WEIGHT CMU FOR ALL WALLS. USE MOISTURE CONTROLLED
MASONRY UNITS LAID UP IN TYPE "S" MORTAR. THE MASONRY WALL ASSEMBLAGE HAS AN
ASSUMED ALLOWABLE f'm = 1350 PSI
2. GROUT ALL REINFORCED CELLS WITH 2,000 PSI GROUT AS PER ASTM C476 & ASTM C404
(8 TO 10" MAX. SLUMP) AND 4'-0" MAXIMUM GROUT LIFT AT TOP OF WALLS.
3. JOINT REINFORCING SHALL BE 9 GAUGE HORIZONTAL LADDER TYPE TIES (USE AA 500
BLOCK-LOK OR EQUAL) SPACED 16" O.C.
4. UNLESS NOTED OTHERWISE ON THE DRAWINGS USE #8 DIA. MINIMUM LAP SPLICES.
VERTICAL REINFORCING SHALL BE LOCATED AT CORNER OF WALLS AND EDGES OF OPENINGS.
REFER TO MASONRY DETAILS ON SHEET S22

LEGEND

	SLOPE
	GRAVEL OR CRUSHED STONE
	CONCRETE
	EARTH/PREPARED SUBGRADE
	STEEL

5. APPROVED BAR POSITIONERS SHALL BE USED AT A MAXIMUM SPACING OF 192 BAR
DIAMETERS FOR ALL VERTICAL REINFORCEMENT IN CMU WALLS AND AT EACH END.
VERTICAL REINFORCING BARS SHALL BE CENTERED IN THE WALLS.
6. BOND BEAMS SHALL BE MADE CONTINUOUS AROUND CORNERS WITH ADDED CORNER BARS.
SEE DETAIL ON SHEET S22.
7. UNLESS NOTED OTHERWISE BOND BEAMS SHALL BE ONE COURSE IN DEPTH.
8. LINTELS FOR OPENINGS IN STRUCTURAL WALLS ARE SHOWN ON SHEET S22.
9. AT BEAM AND LINTEL BEARING LOCATIONS, SOLID GROUT 4' CELLS UNDER BEARING FOR
FULL HEIGHT WITH 1 BAR IN EACH CELL. PROVIDE MATCHING FOUNDATION DOWELS IN
SAME GROUTED CELL.
10. DURING CONSTRUCTION THE CONTRACTOR SHALL PROVIDE ADEQUATE
TEMPORARY BRACING FOR ALL MASONRY WALLS.
11. FOR TYPICAL MASONRY DETAILS, VERTICAL AND HORIZONTAL REINFORCEMENT,
REFER TO SHEETS S21.

MISCELLANEOUS

1. ALL STANDING SEAM ROOF PANELS, CONNECTIONS AND MISCELLANEOUS
MATERIALS SHALL BE DESIGNED BY THE MANUFACTURER TO WITHSTAND THE
WIND UPLIFT LOADINGS AND THE SNOW LOADINGS SHOWN ON THIS SHEET
FOR ADDITIONAL INFORMATION REFER TO SHEET S-23, ARCH DWGS AND SPECIFICATIONS.
2. ALL OPENINGS IN ROOF OVER 9" IN ANY DIRECTION SHALL HAVE 3 x 3 1/4"
ANGLE FRAME (4 SIDES) BETWEEN JOISTS UNLESS OTHERWISE NOTED ON PLAN.
3. SEE ARCHITECTURAL DRAWINGS FOR MISCELLANEOUS STEEL REQUIREMENT.

JOIST DESIGN INFORMATION

ROOF JOIST DESIGN REQUIREMENTS

1. THE STEEL JOISTS SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH
THE LATEST SPECIFICATIONS OF THE STEEL JOIST INSTITUTE. THE JOISTS
SHALL BE FIELD WELDED TO THEIR SUPPORTS AS REQUIRED BY THE JOIST
MANUFACTURER TO RESIST THE NET WIND UPLIFT LOADS AND GRAVITY LOADS SHOWN
ON THIS SHEET. THE JOISTS SHALL BE LOCATED ON THE ERECTION DRAWINGS FOR
PROPER FABRICATION AND ERECTION.
2. THE STEEL JOISTS SHALL BE DESIGNED AND/OR VERIFIED BY THE JOISTS
MANUFACTURER/DESIGNER FOR THE LOADS SHOWN ON THE STRUCTURAL DRAWINGS
PRIOR TO THE FABRICATION. THE JOIST MANUFACTURER SHALL SUBMIT JOIST
BRIDGING AND ALL OTHER CONNECTION DETAILS TO THE CONTRACTING OFFICER
FOR APPROVAL PRIOR TO CONSTRUCTION. WHERE APPLICABLE USE L-1/2X1 1/2X7/8"
CROSS BRACING AT THE ENDS OF THE JOIST HORIZONTAL BRIDGING RUNS.
3. JOISTS DESIGNATED AS "SP" SHALL BE DESIGNED FOR ADDITIONAL GRAVITY AND
AND LATERAL LOADS FROM THE SUSPENDED OPERABLE WALL PANELS. GRAVITY
AND LATERAL LOADS SHALL BE OBTAINED FROM THE WALL PANEL SUPPLIER BY THE
GENERAL CONTRACTOR AND GIVEN TO THE JOIST MANUFACTURER FOR JOIST DESIGN.
4. LOADING CASES FOR ROOF JOISTS
D + 0.75*(L or S+W)
D + (S or L)
D + 0.75*W
• MINIMUM LIVE LOAD - 20 PSF

STEEL ROOF DECK REQUIREMENTS

1. THE STEEL ROOF DECK SHALL BE GALVANIZED 1 1/2" DEEP X 20 GA WITH A WIDE RIB
CONFIGURATION. PANELS SHALL BE CONTINUOUS OVER AT LEAST THREE SUPPORTS.
PANEL ENDS SHALL BE ANCHORED TO SUPPORTS WITH A MINIMUM OF (3) 1/2" DIA.
PUDDLE WELDS AND SEAM FASTENED WITH 1 1/2" LONG SEAM WELDS SPACED 18" O.C.
THE MARGINS OF THE DECK (PARALLEL TO THE RIBS) SHALL BE ANCHORED TO THE
SUPPORT WITH 1/2" DIA. PUDDLE WELDS SPACED 18" O.C. THE DESIGN DIAPHRAGM
SHEAR IS 397 PLF. (SEE SPECS FOR ADDITIONAL INFORMATION)

FLOOR JOIST DESIGN REQUIREMENTS

1. THE STEEL JOISTS SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH
THE LATEST SPECIFICATIONS OF THE STEEL JOIST INSTITUTE. THE JOISTS
SHALL BE LOCATED ON THE ERECTION DRAWINGS FOR PROPER FABRICATION AND
ERECTION.
2. THE STEEL JOISTS SHALL BE DESIGNED AND/OR VERIFIED BY THE JOISTS
MANUFACTURER/DESIGNER FOR THE LOADS SHOWN ON THE STRUCTURAL DRAWINGS
PRIOR TO THE FABRICATION. THE JOIST MANUFACTURER SHALL SUBMIT JOIST
BRIDGING AND ALL OTHER CONNECTION DETAILS TO THE CONTRACTING OFFICER
FOR APPROVAL PRIOR TO CONSTRUCTION. WHERE APPLICABLE USE L-1/2X1 1/2X7/8"
CROSS BRACING AT THE ENDS OF THE JOIST HORIZONTAL BRIDGING RUNS.
3. JOISTS DESIGNATED AS "SP" SHALL BE DESIGNED FOR ADDITIONAL GRAVITY AND
AND LATERAL LOADS FROM THE SUSPENDED OPERABLE WALL PANELS. GRAVITY
AND LATERAL LOADS SHALL BE PROVIDED BY THE WALL PANEL SUPPLIER.

STEEL FORM DECK REQUIREMENTS

3. THE STEEL FORM DECK FOR THE SECOND FLOOR SLAB SHALL HAVE THE FOLLOWING
MINIMUM SECTION PROPERTIES:
DEPTH = 1 1/2" ±
THICKNESS = 0.0295"
I = 0.021 IN⁴ PER FT
S = 0.068 IN³ PER FT.
4. THE FLOOR DECK SHALL BE CONTINUOUS FOR THREE OR MORE SPANS WHENEVER
POSSIBLE.

STEEL STAIRCASE

STEEL STAIRCASE SUPPLIER SHALL SUPPLY COMPLETE SHOP DRAWINGS
AND ERECTION DRAWINGS TO THE CONTRACTING OFFICER FOR APPROVAL BEFORE
CONSTRUCTION.

MISC ITEMS FOR ELEVATOR

CONTRACTOR SHALL DESIGN AND COORDINATE THE EMBEDDED AND MISC STEEL
ITEMS REQUIRED FOR THE ELEVATOR WITH THE ELEVATOR SUPPLIER AND SHALL
SUBMIT THE DETAILS TO THE CONTRACTING OFFICER FOR APPROVAL BEFORE
CONSTRUCTION.

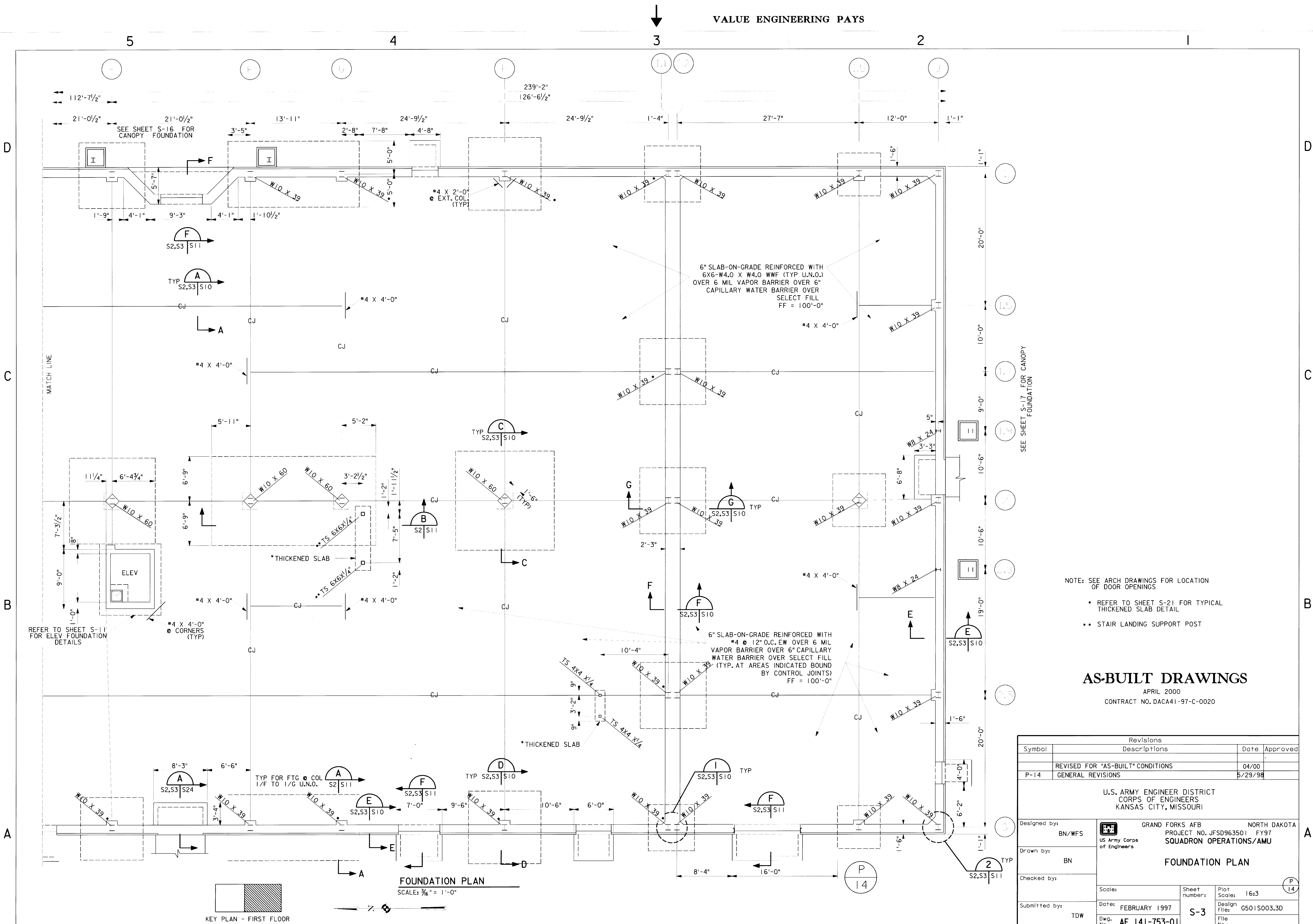
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	B.N.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	BN	LEGEND, GENERAL NOTES & JOIST LOADING DIAGRAMS	
Checked by:		Scale:	Sheet number: Plot Scale: 16:3
Submitted by:	TDW	Date: FEBRUARY 1997	Design File: S-1
		Dwg. No.: AF 141-753-01	File No.:

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



VALUE ENGINEERING PAYS



NOTE: SEE ARCH DRAWINGS FOR LOCATION OF DOOR OPENINGS

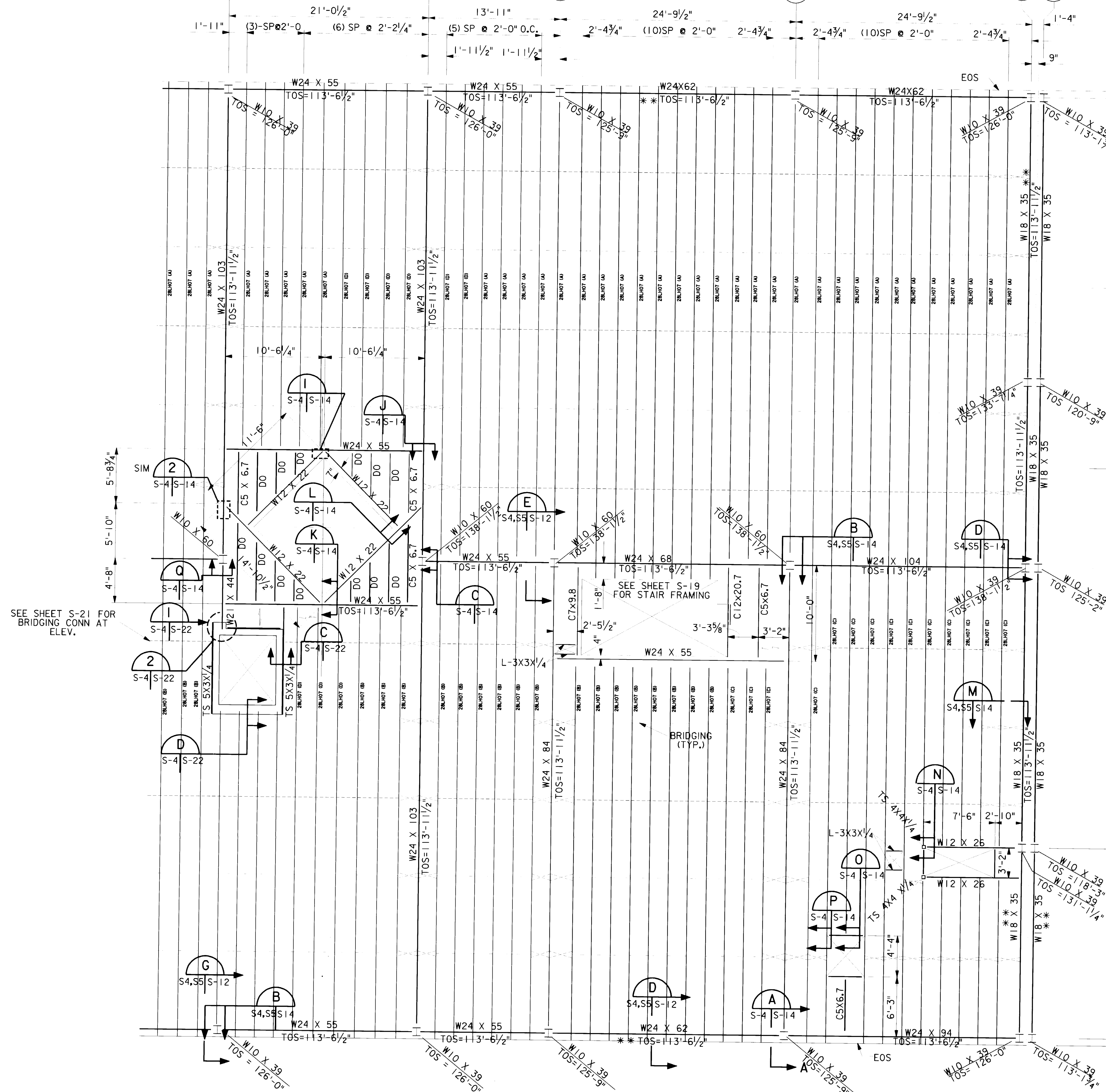
- REFER TO SHEET S-21 FOR TYPICAL THICKENED SLAB DETAIL
- • STAIR LANDING SUPPORT POST

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
P-14	GENERAL REVISIONS	5/29/98	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	BN/WFS	GRAND FORKS AFB NORTH DAKOTA	
Drawn by:	BN	PROJECT NO. JFSD963501 FY97	
Checked by:		SQUADRON OPERATIONS/AMU	
Submitted by:	TDW	FOUNDATION PLAN	
Scale:		Sheet number:	Plot Scale: 1/6:3
Date:	FEBRUARY 1997	Design File:	G501S003.30
Dwg. No.:	AF 141-753-01	File No.:	

631-000-156-93 S-3



AS-BUILT DRAWINGS


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CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	BN/WFS	Grand Forks AFB NORTH DAKOTA	
Drawn by:	BN	PROJECT NO. JFSD963501 FY97	
Checked by:		SQUADRON OPERATIONS/AMU	
Submitted by:	TDW		
Scale:	3/8" = 1'	Sheet number:	S-4
Date:	FEBRUARY 1997	Plot Scale:	1/8" = 1'
Dwg. No.:	AF 141-753-01	Design File:	G501S004.3D
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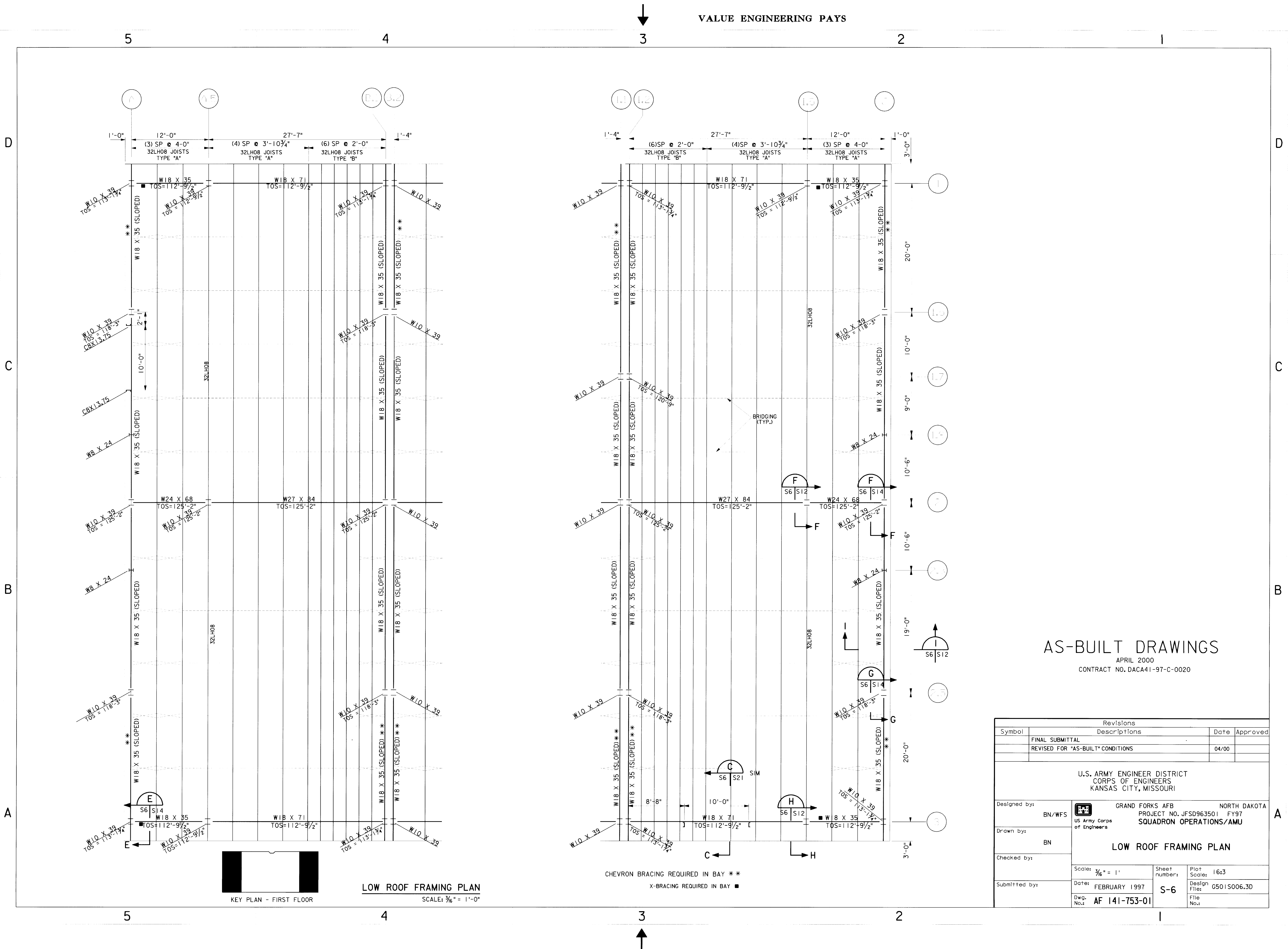


Revisions				
Symbol	Descriptions	Date	Approved	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00		

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by:		<p style="text-align: center; font-weight: bold;">GRAND FORKS AFB</p> <p style="text-align: center;">PROJECT NO. JFSD963501</p> <p style="text-align: center; font-weight: bold;">SQUADRON OPERATIONS/AMU</p>	NORTH DAKOTA FY97
BN/WFS	US Army Corps of Engineers		
Drawn by:		<p style="font-size: 1.5em; font-weight: bold;">SECOND FLOOR FRAMING PLAN</p>	
BN			
Checked by:			
Submitted by:	<p>Date:</p> <p style="font-weight: bold;">FEBRUARY 1997</p> <p>Dwg. No. AF 141-753-01</p>	<p>Scale: $\frac{3}{16}'' = 1'$</p> <p>Sheet number:</p> <p style="font-size: 1.5em; font-weight: bold;">S-5</p>	<p>Plot Scale: 1x3</p> <p>Design File: GS01S005.3D</p> <p>File No:</p>
TDW			

631-000- 156-95 S-5

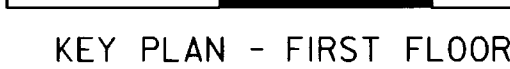


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	FINAL SUBMITTAL		
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	BN/WFS	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	BN	LOW ROOF FRAMING PLAN	
Checked by:		Scale: 3/16" = 1'	Sheet number: S-6 Plot Scale: 1/64"
Submitted by:		Date: FEBRUARY 1997	Design File: G501S006.3D
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631-000- 156-96 S-6

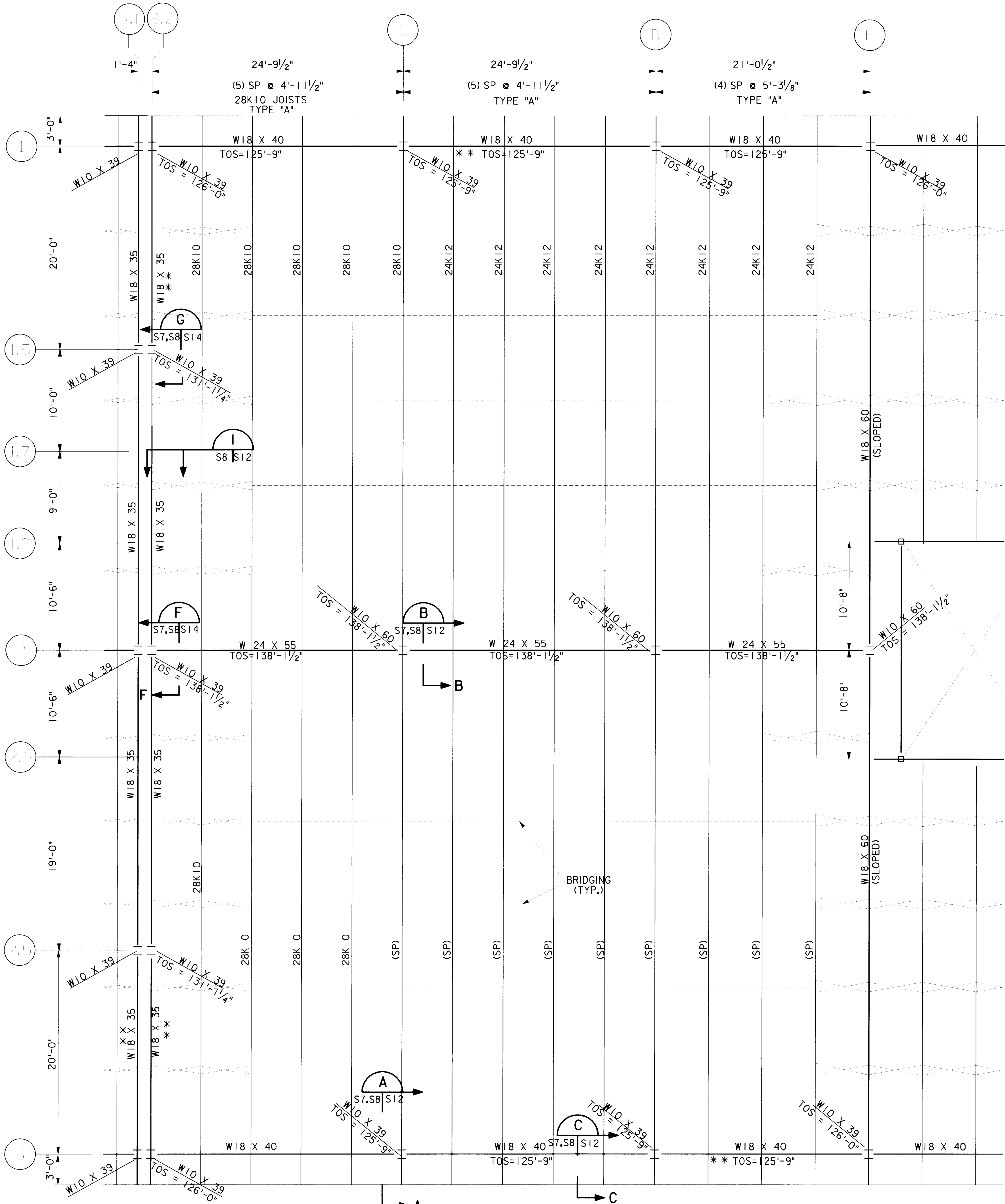


CHEVRON BRACING REQUIRED IN BAY **

CONTRACT NO. DACA41-97-C-0020

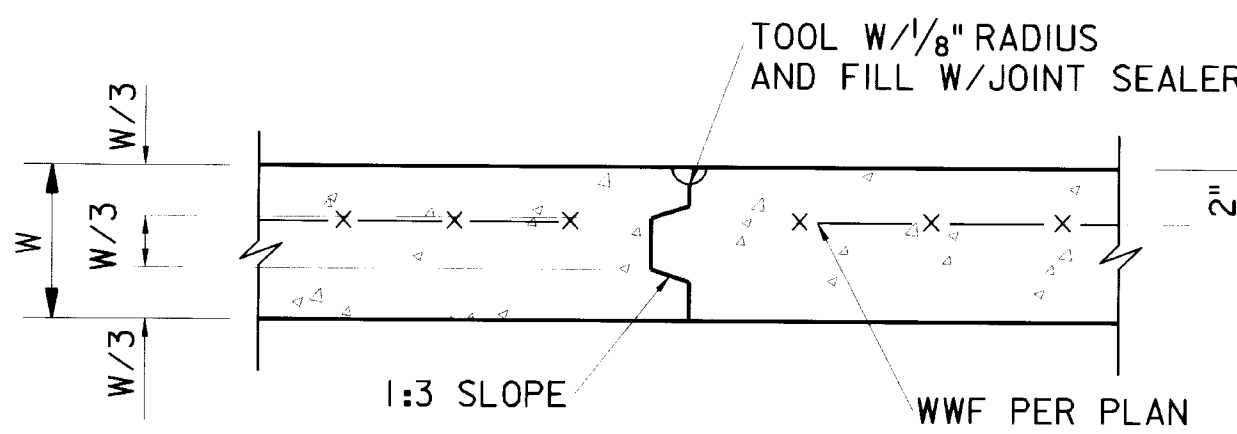
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by: BN/WFS	 GRAND FORKS AFB NORTH DAKOTA US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by: BN	HIGH ROOF FRAMING PLAN		
Checked by: -	Scale: $\frac{3}{16}" = 1'$	Sheet number:	Plot Scale: 16:3 Design File:
Submitted by: TDW	Date: FEBRUARY 1997	S-7	G501S007.3D
Dwg. No.	AF 141-753-01	File No.	G501S007.3D

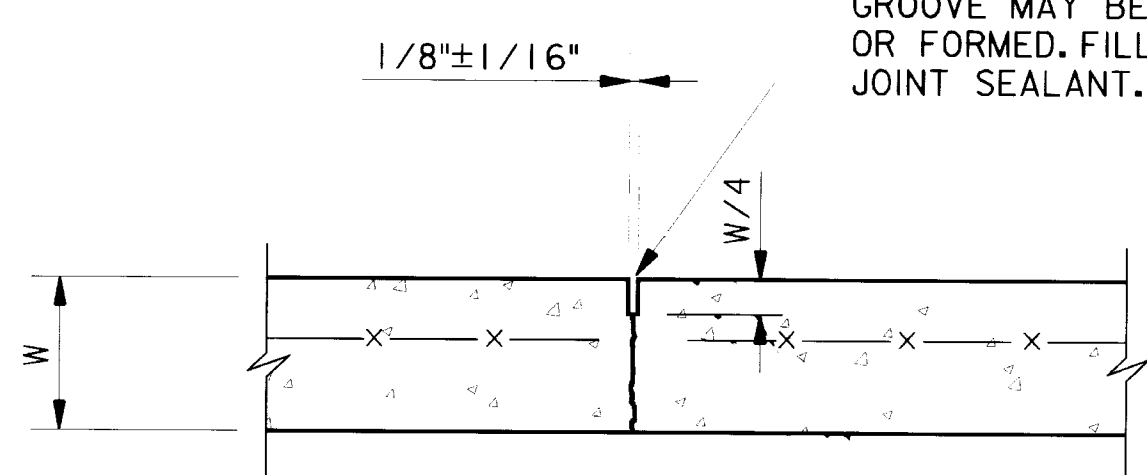


FOOTING SCHEDULE

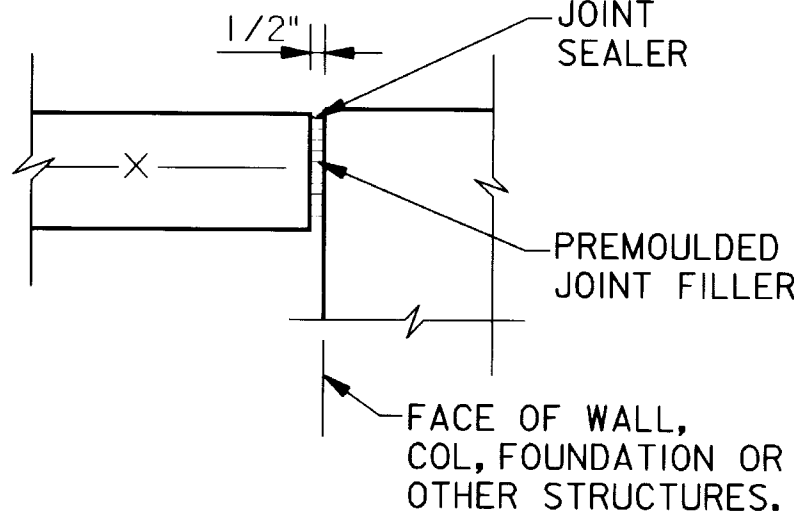
FOOTING LOCATION	FOOTING SIZE	BEARING ELEVATION	REINFORCING		COMMENTS
			LONGITUDINAL	TRANSVERSE	
D-1 & D-3	10'-6"x 10'-6"x 1'-6"	93'-6"	(13)-#5 EQ. SP.	(13)-#5 EQ. SP.	
C-2 & H-2	15'-0"x 15'-0"x 1'-6"	96'-10"	(25)-#5 EQ. SP.	(25)-#5 EQ. SP.	
E-2	13'-0"x 13'-0"x 1'-6"	95'-0"	(15)-#5 EQ. SP.	(15)-#5 EQ. SP.	
D-2	14'-6"x 14'-6"x 1'-6"	96'-10"	(22)-#5 EQ. SP.	(22)-#5 EQ. SP.	
H-1, H-3, C-1	11'-0"x 11'-0"x 1'-6"	93'-6"	(14)-#5 EQ. SP.	(14)-#5 EQ. SP.	
C-3	11'-0"x 11'-0"x 1'-6"	92'-0"	(14)-#5 EQ. SP.	(14)-#5 EQ. SP.	
I-1, I-2, I-2.5 B-1.5, B-2.5	10'-0"x 10'-0"x 1'-6"	96'-10"	(13)-#5 EQ. SP.	(13)-#5 EQ. SP.	
I-1	8'-6"x 8'-6"x 1'-6"	93'-6"	(11)-#5 EQ. SP.	(11)-#5 EQ. SP.	
I-3 & B-1	7'-0"x 7'-0"x 1'-6"	93'-6"	(9)-#5 EQ. SP.	(9)-#5 EQ. SP.	
B-2	11'-0"x 11'-0"x 1'-6"	96'-10"	(14)-#5 EQ. SP.	(14)-#5 EQ. SP.	
A-5-1, A-5-3, I-5-1, I-5-3	6'-6"x 6'-6"x 1'-6"	93'-6"	(8)-#5 EQ. SP.	(8)-#5 EQ. SP.	
E-1	10'-0"x 10'-0"x 1'-6"	91'-0"	(13)-#5 EQ. SP.	(13)-#5 EQ. SP.	
A-5-2 & I-5-2	8'-0"x 8'-0"x 1'-6"	96'-10"	(10)-#5 EQ. SP.	(10)-#5 EQ. SP.	
E-3	9'-6"x 9'-6"x 1'-6"	93'-6"	(12)-#5 EQ. SP.	(12)-#5 EQ. SP.	
B-3	7'-0"x 7'-0"x 1'-6"	92'-0"	(9)-#5 EQ. SP.	(9)-#5 EQ. SP.	



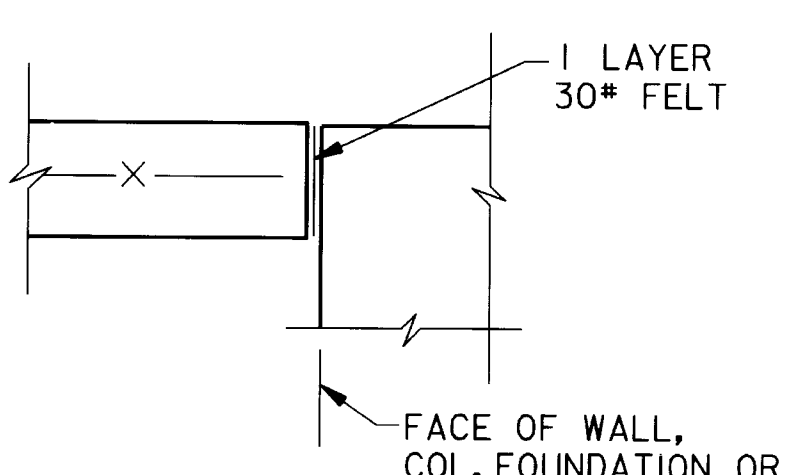
KEYED CONSTRUCTION JOINT



CJ
CONTRACTION JOINT

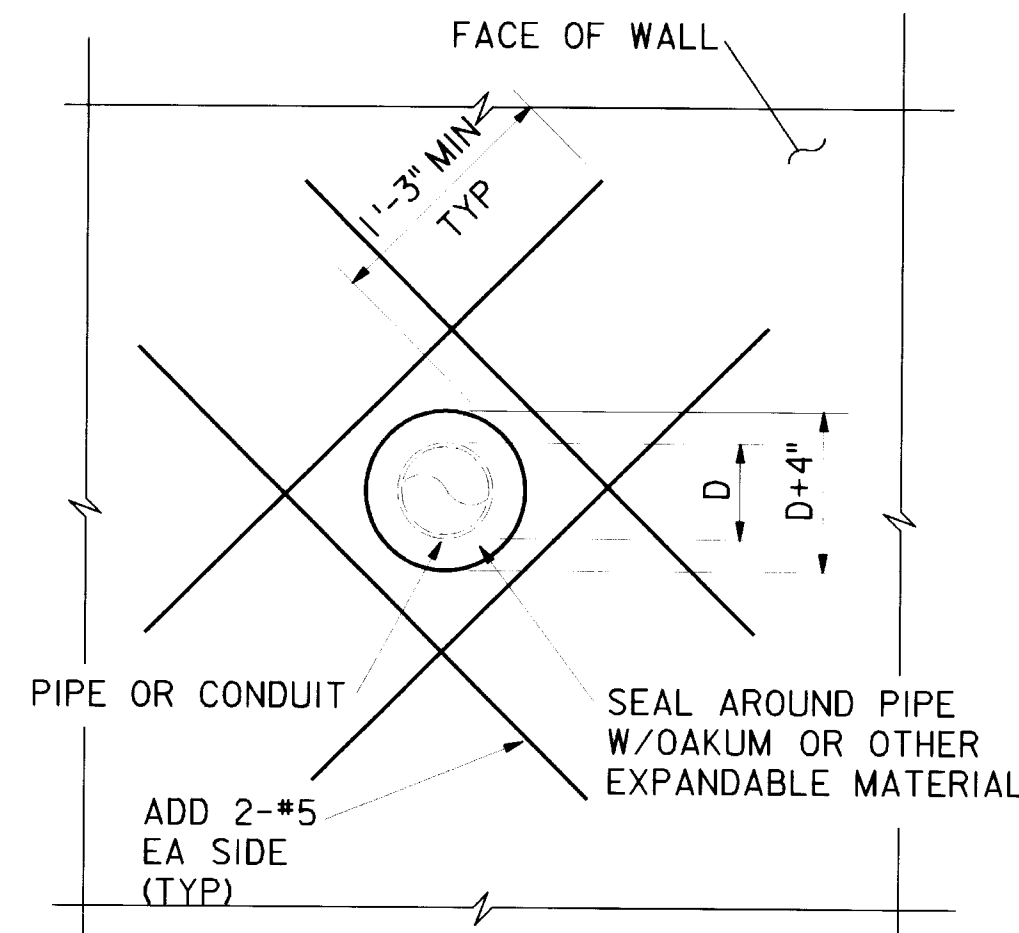


EXPANSION JOINT (EJ)

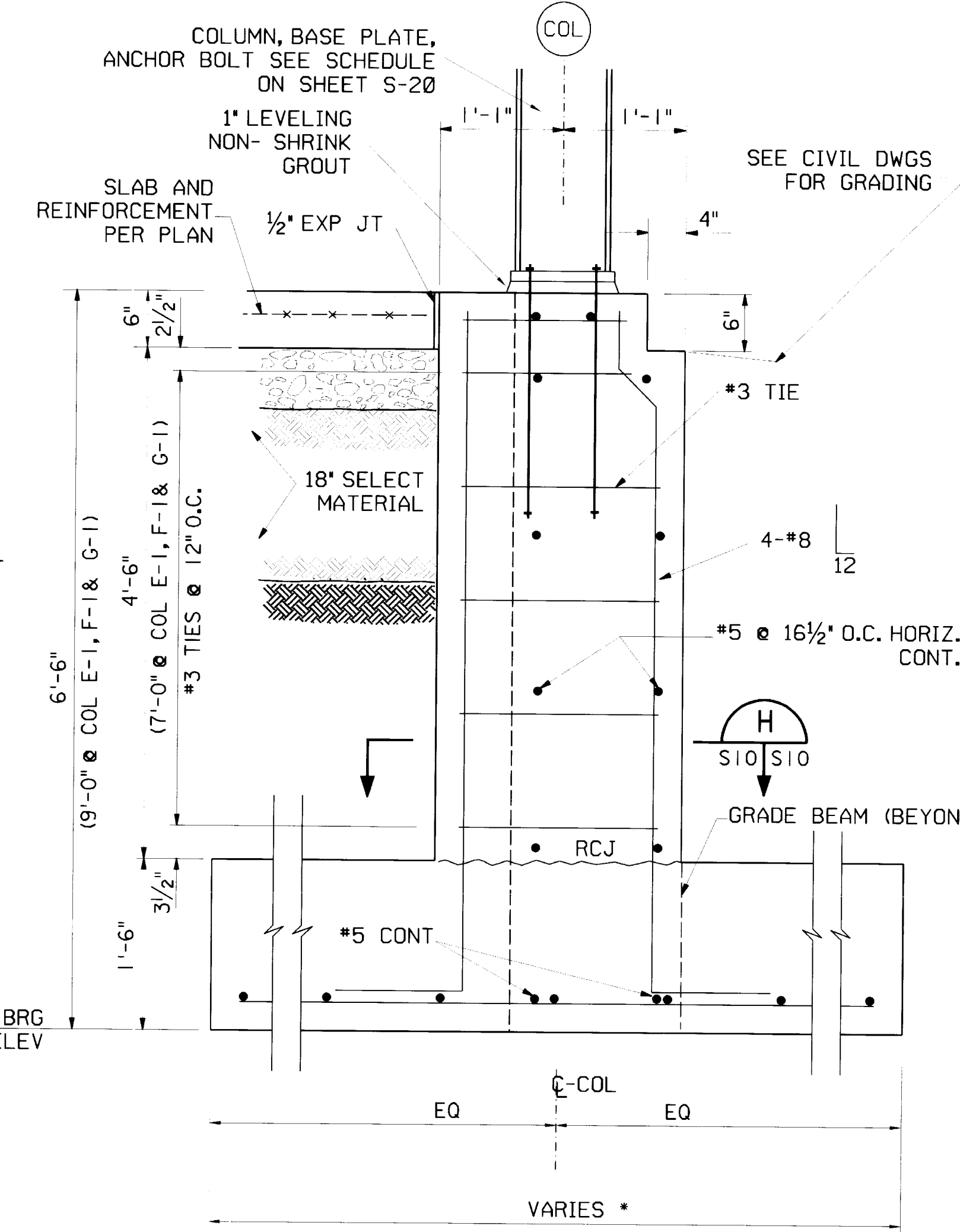


ISOLATION JOINT (ISJ)

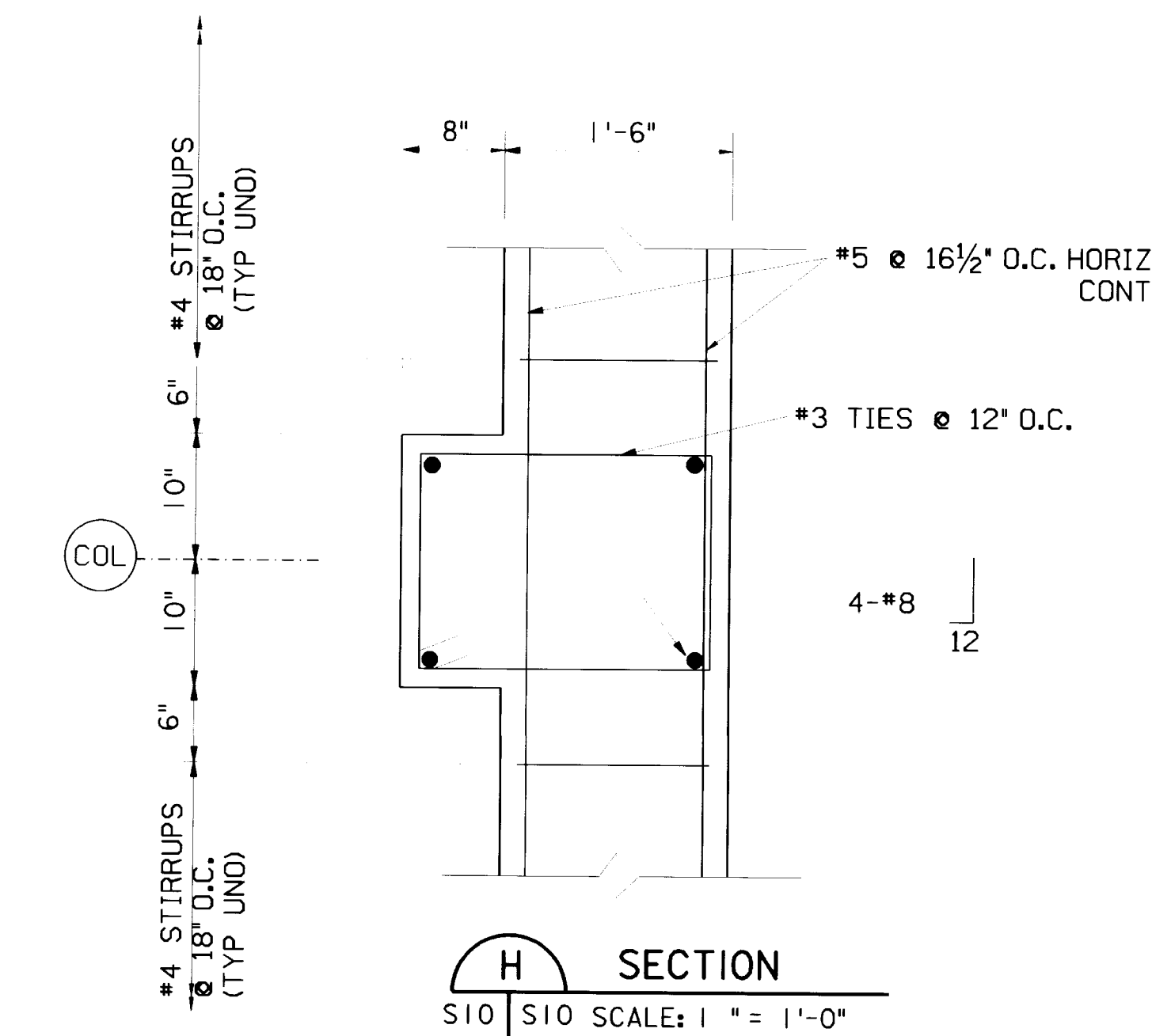
JOINT DETAILS



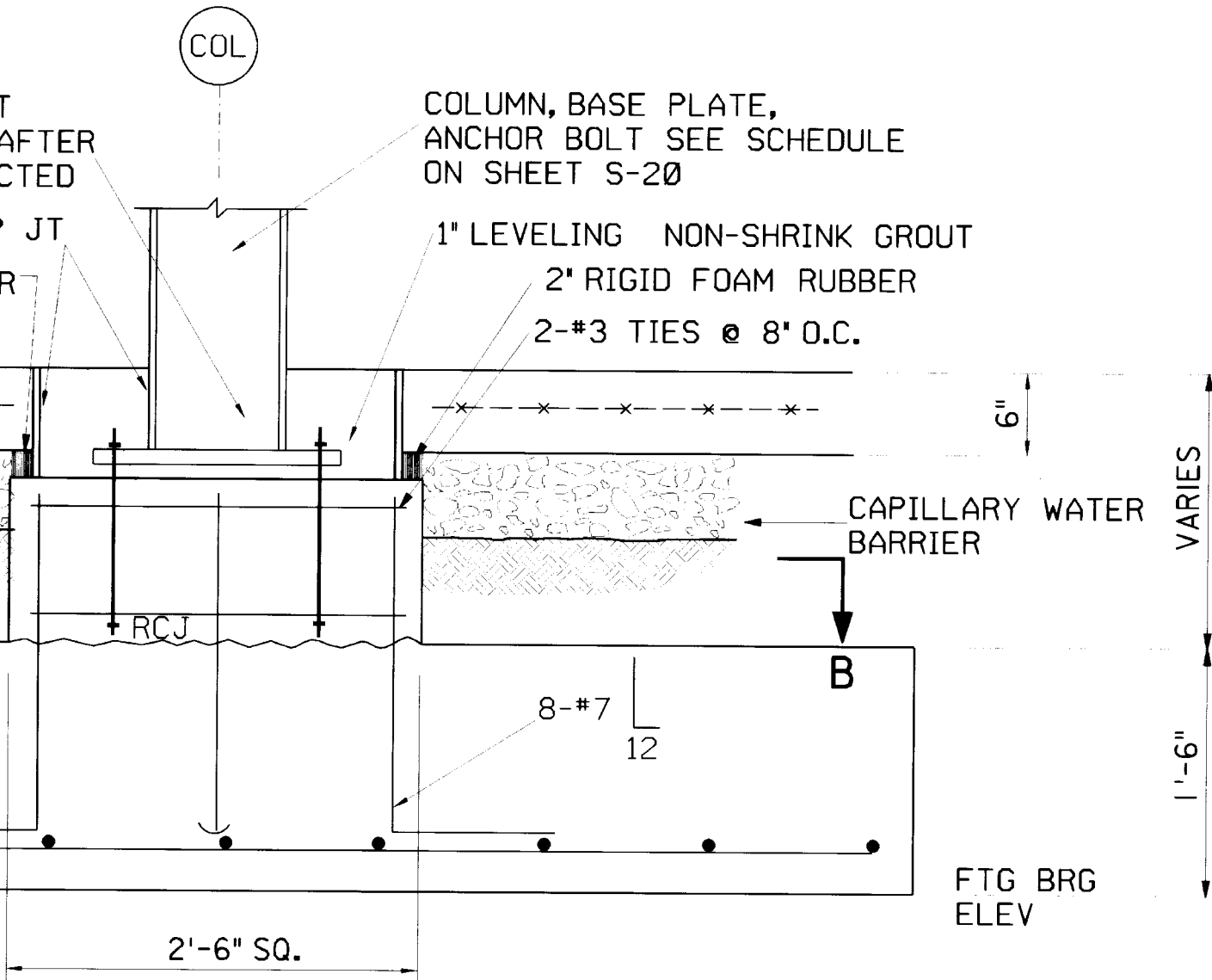
TYPICAL REINFORCEMENT
AROUND PIPE PENETRATIONS
NOT TO SCALE



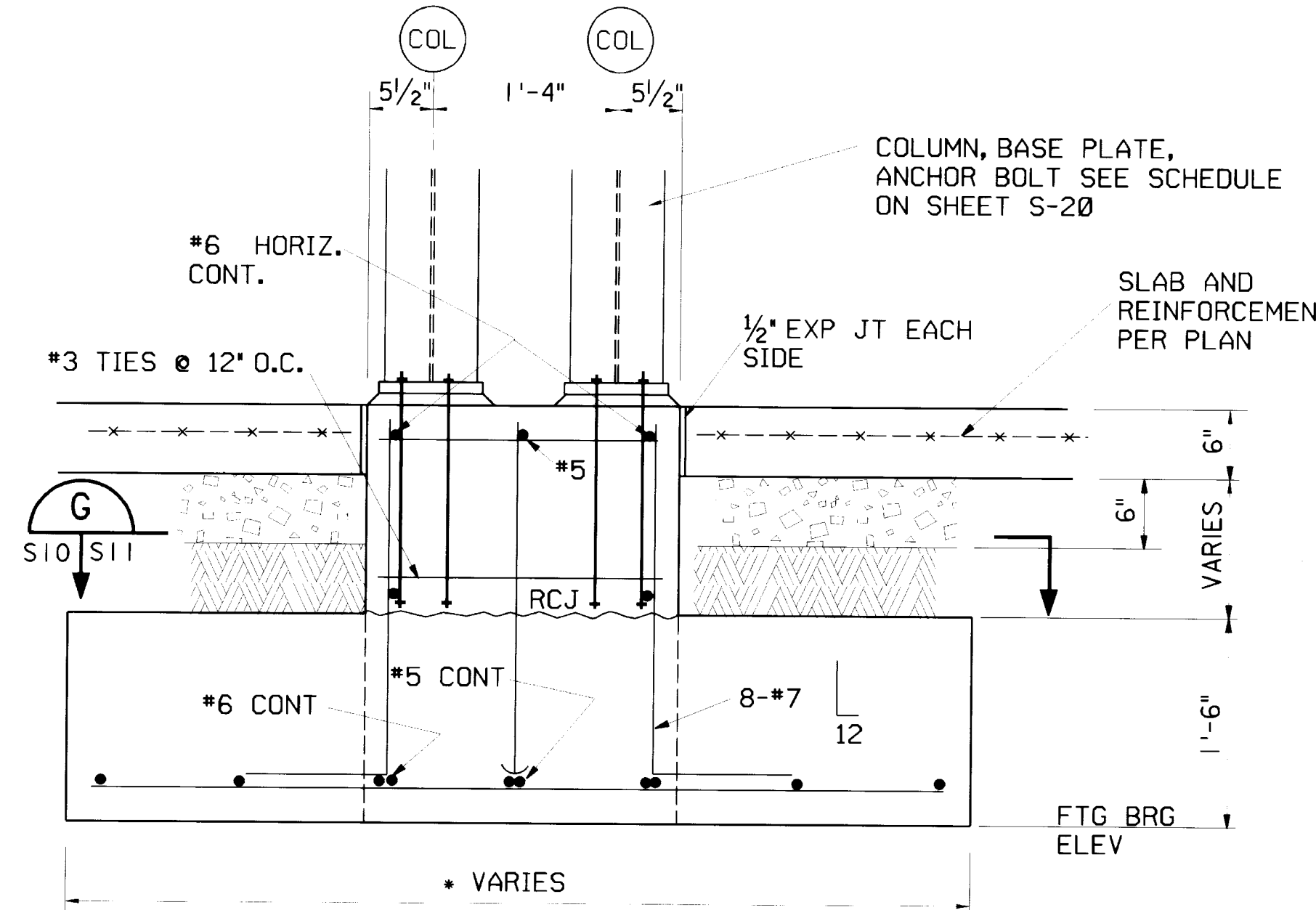
SECTION D
S2,S3 S10 SCALE: 1" = 1'-0"



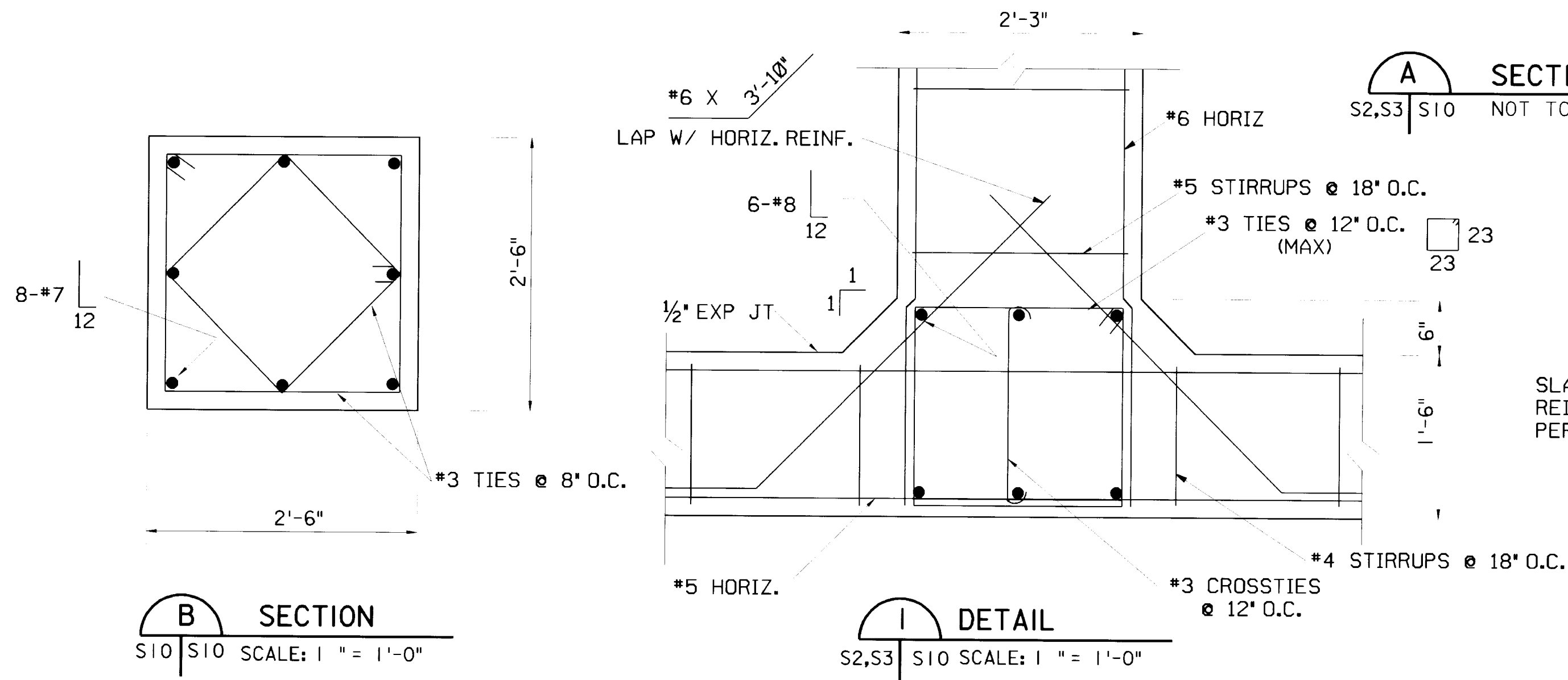
SECTION H
S10 S10 SCALE: 1" = 1'-0"



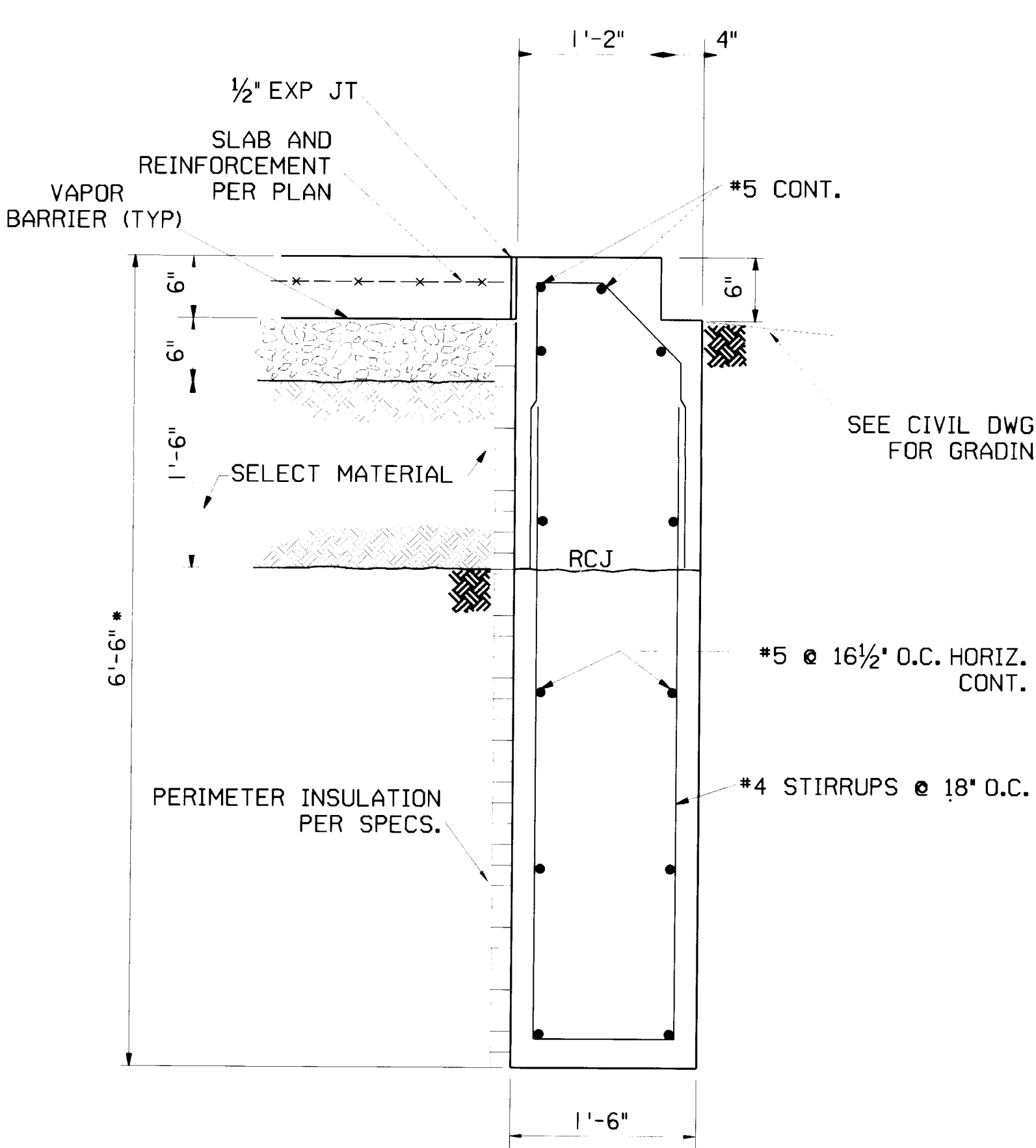
SECTION C
S2,S3 S10 SCALE: 1" = 1'-0"



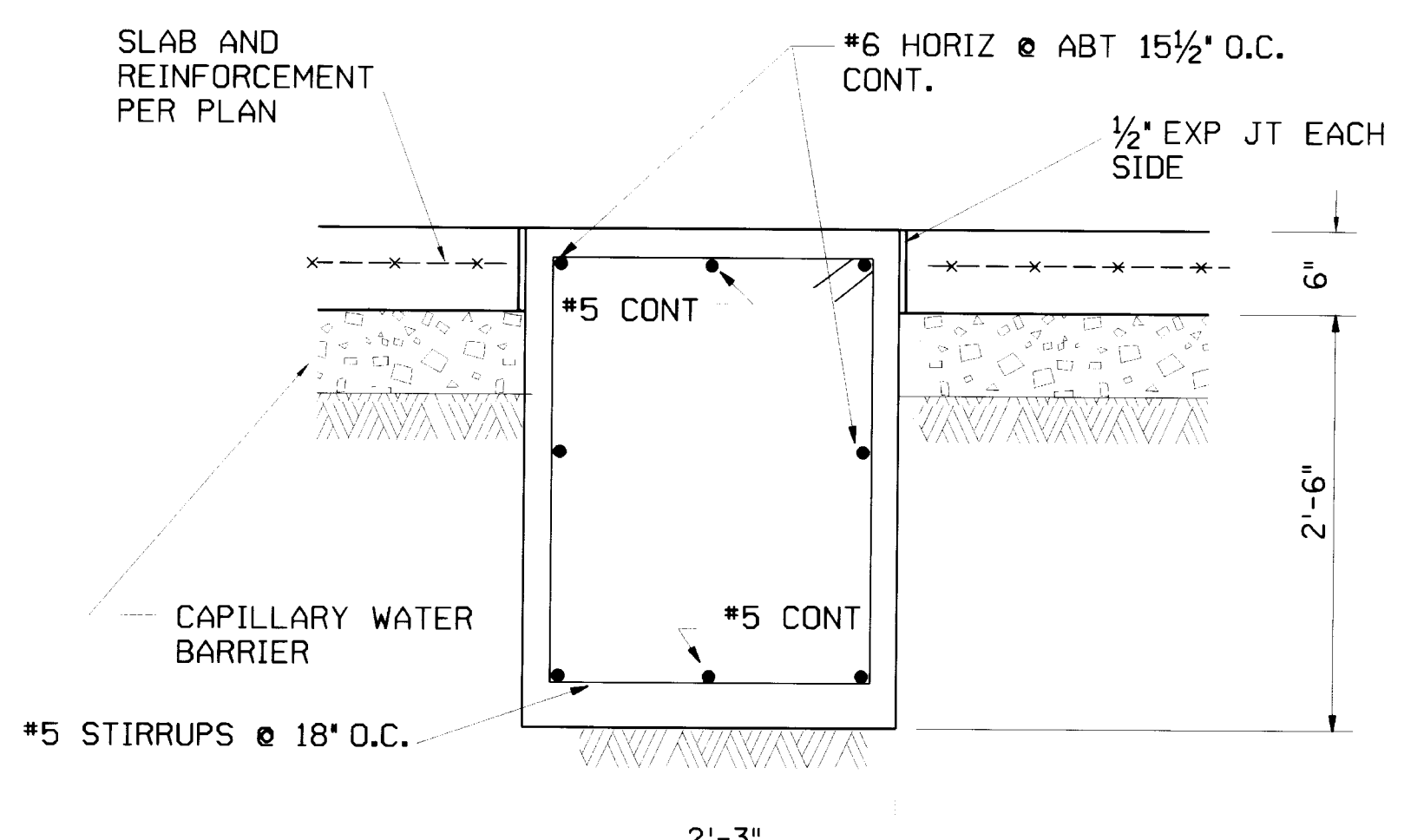
SECTION G
S2,S3 S10 SCALE: 1" = 1'-0"



SECTION B
S10 S10 SCALE: 1" = 1'-0"



SECTION E
S2,S3 S10 SCALE: 1" = 1'-0"



SECTION F
S2,S3 S10 SCALE: 1" = 1'-0"

GRADE BEAM DEPTH VARIES
NEAR COL. E1, F1, & G1
SEE ELEV. ON SHEET S-24

FOR FOOTING DIMENSIONS
AND REINFORCING SEE
FOOTING SCHEDULE

FOR FOOTING DIMENSIONS
AND REINFORCING SEE
FOOTING SCHEDULE

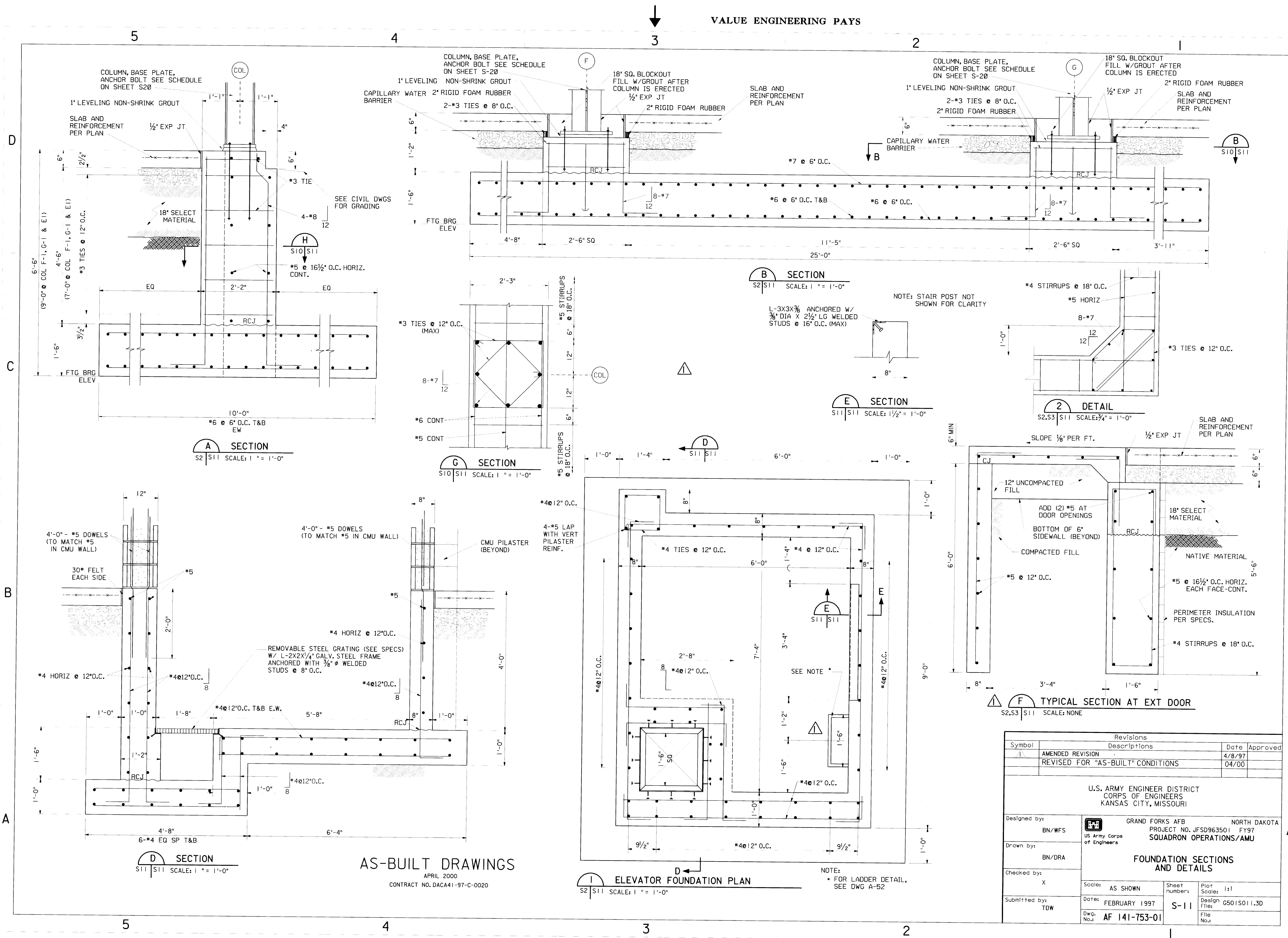
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
Δ	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	BN	GRAND FORKS AFB US Army Corps of Engineers PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	BN	FOUNDATION SECTIONS, DETAILS & FOOTING SCHEDULE	
Checked by:	-	Scale: 1" = 1'-0"	Sheet numbers: S-10
Submitted by:	TDW	Date: FEBRUARY 1997	Plot Scale: 1:1
		Dwg. No.: AF 141-753-01	File: G501S010.3D

631-000-156-100 S-10

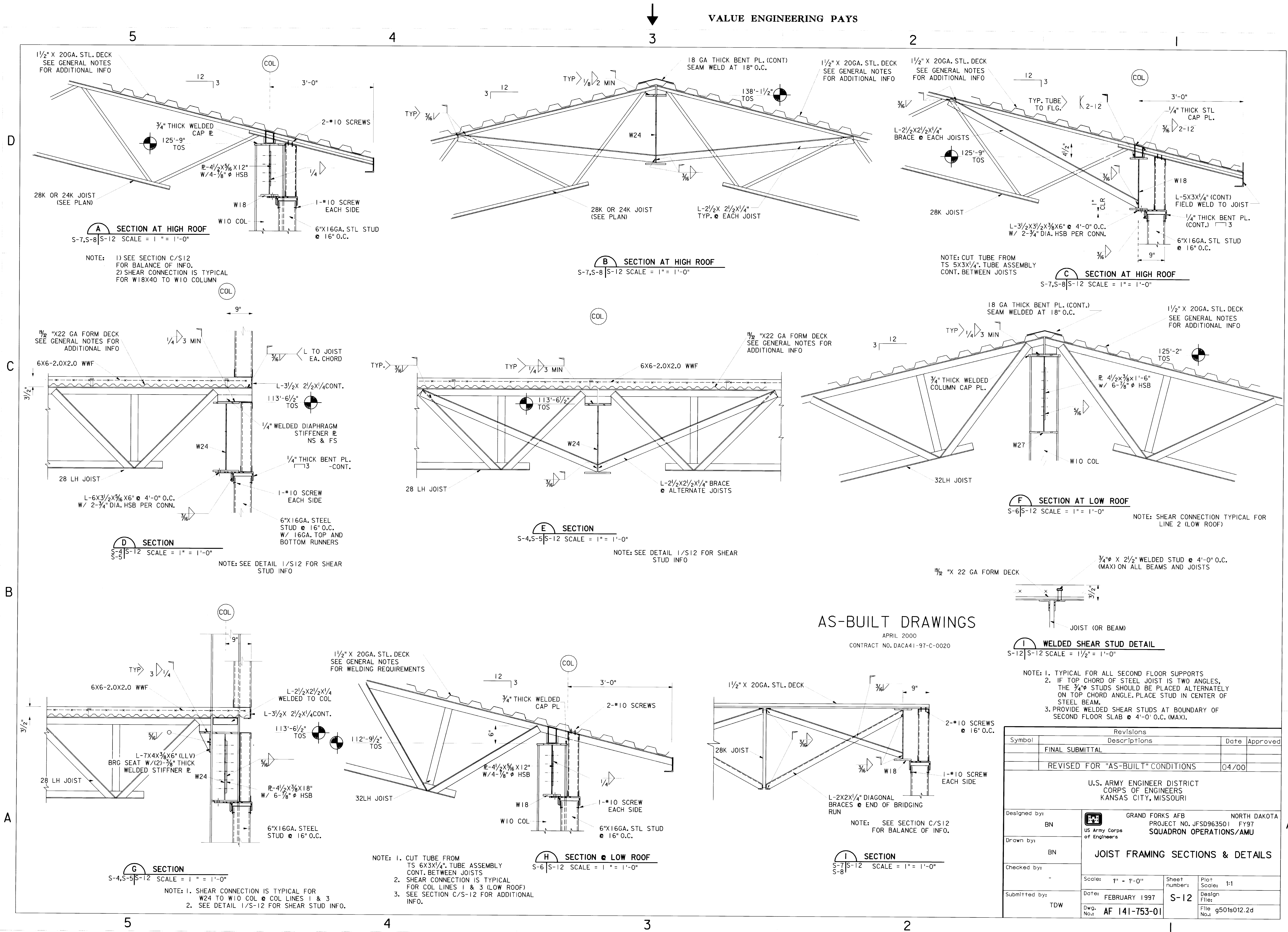
VALUE ENGINEERING PAYS



63-000-156-101 S-11

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	BN/WFS	GRAND FORKS AFB PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	BN/DRA	FOUNDATION SECTIONS AND DETAILS	
Checked by:	X	Scale:	AS SHOWN
Submitted by:	TDW	Date:	FEBRUARY 1997
		Dwg. No.:	AF 141-753-01
		Sheet number:	S-11
		Plot Scale:	1:1
		Design File:	G501S011.3D
		File No.:	

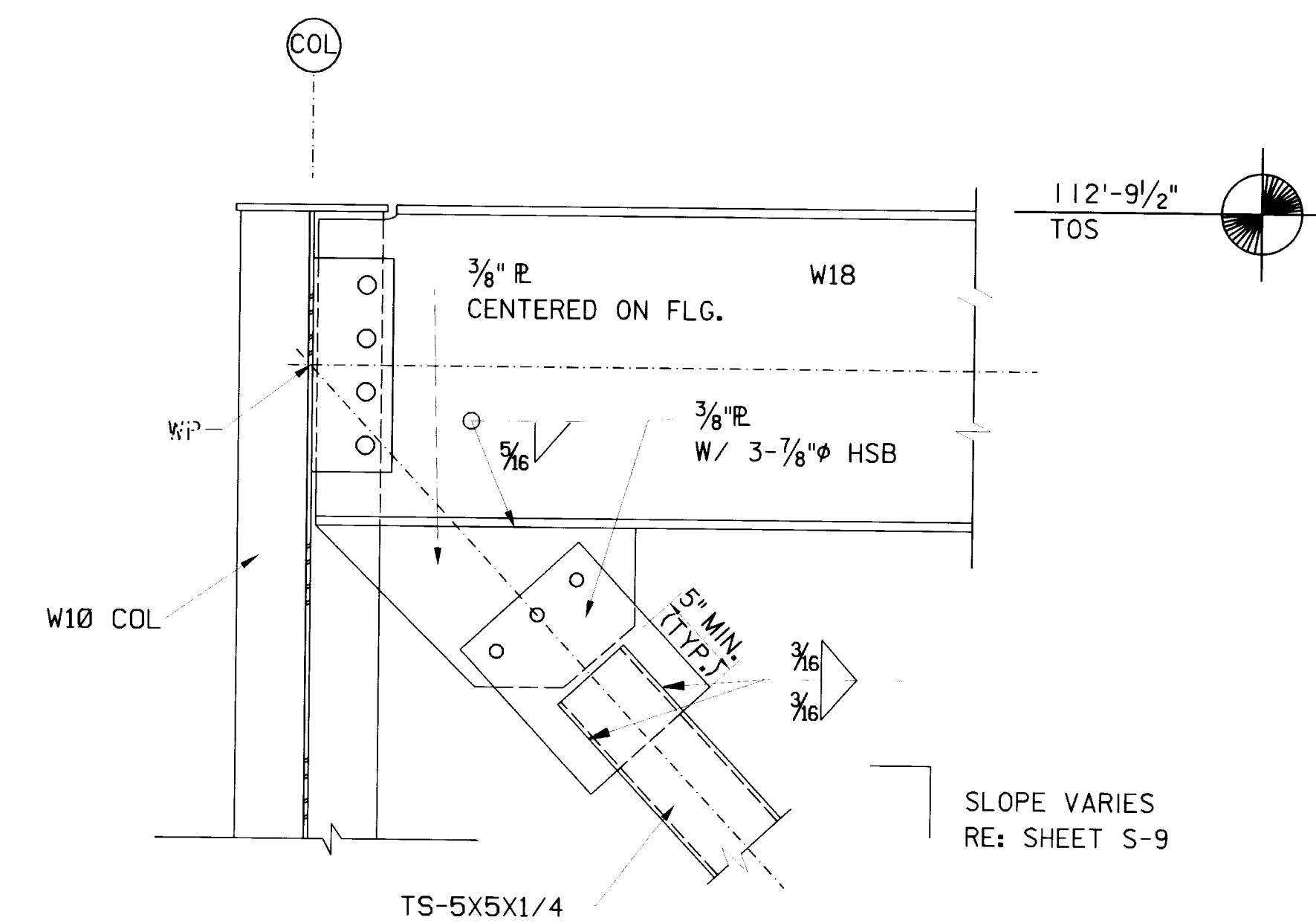


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

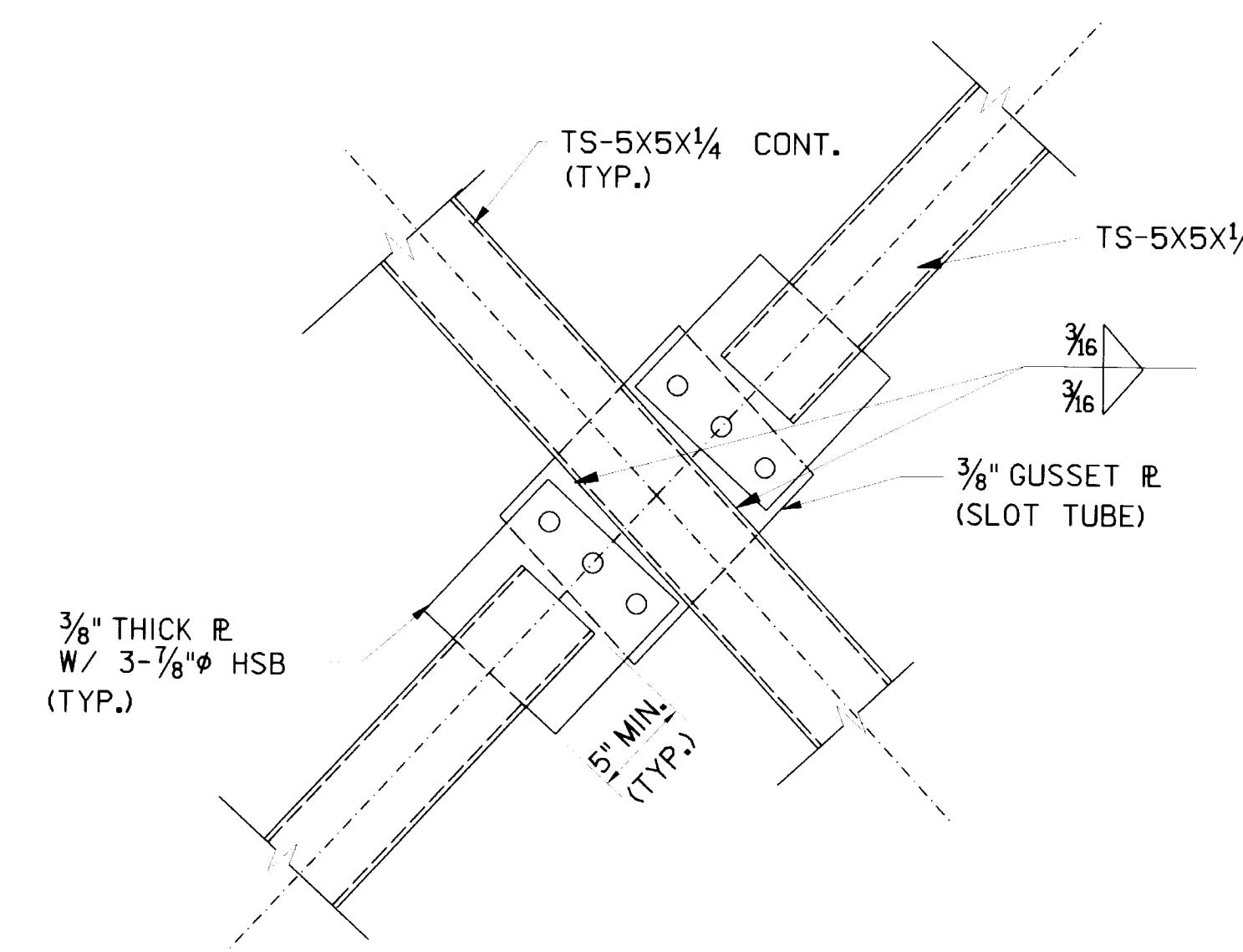
Revisions		
Symbol	Descriptions	Date Approved
	FINAL SUBMITTAL	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI		
Designed by:	BN	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU NORTH DAKOTA FY97
Drawn by:	BN	JOIST FRAMING SECTIONS & DETAILS
Checked by:	-	Scale: 1" = 1'-0"
Submitted by:	TDW	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01 Sheet number: S-12 Plot Scale: 1:1 Design File: g501s012.2d Not:

631-000-156-102 S-12



3 TYPICAL CONNECTION AT ROOF BEAM
S-9 | S-13 SCALE = 1 1/8" = 1'-0" NOTE: 1. DIMENSIONS NOT SHOWN

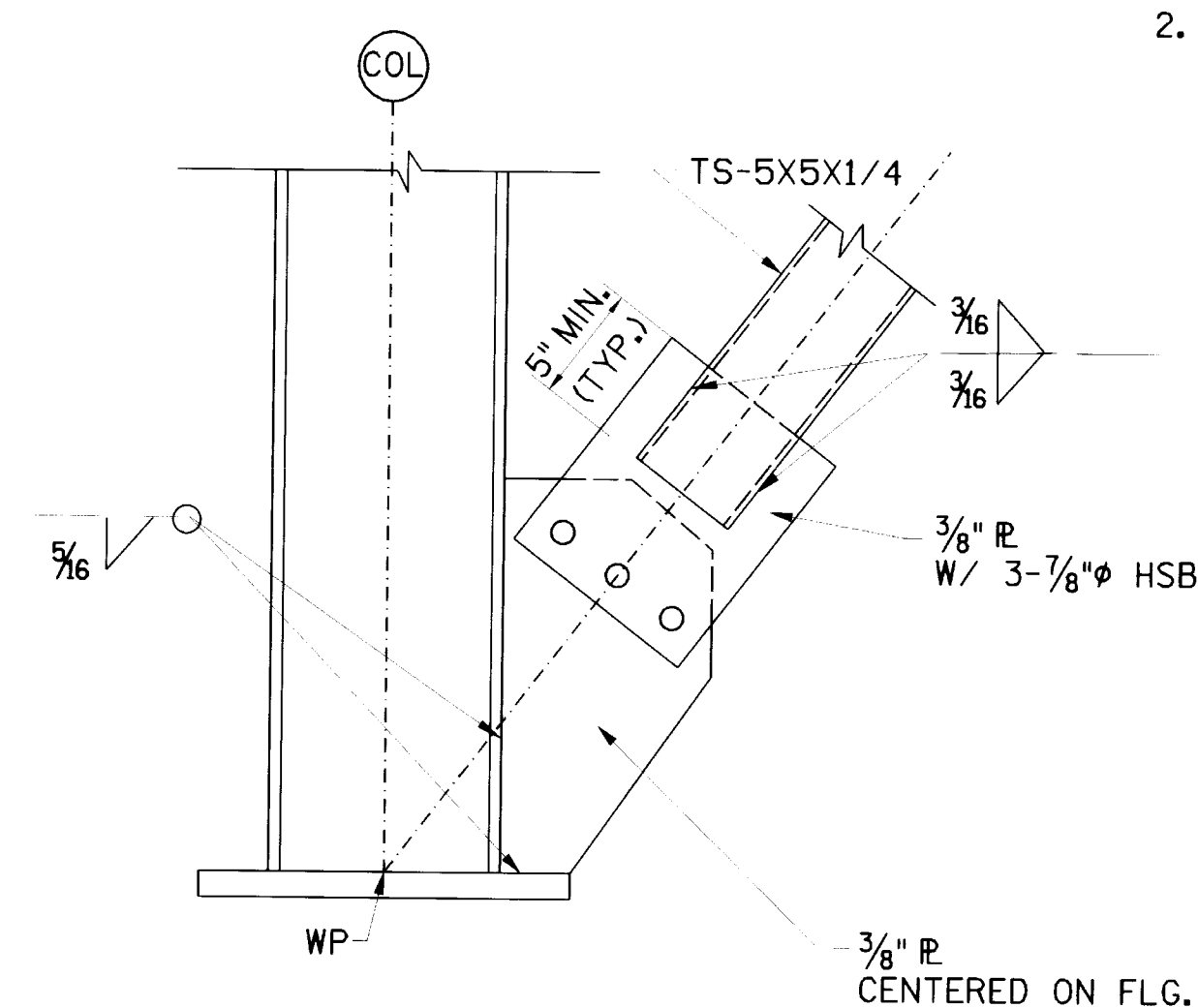
NOTE: 1. DIMENSIONS NOT SHOWN ARE TO
BE PROVIDED BY STEEL FABRICATOR
2. SEE SECTION H/S12 FOR ADDITIONAL
INFORMATION



6 DETAIL
S-9 | S-13 SCALE = 1 1/2" = 1'0"

NOTE: 1. DIMENSIONS NOT SHOWN ARE TO
BE PROVIDED BY STEEL FABRICATOR
2. SEE SECTION D/S14 FOR ADDITIONAL
INFORMATION

NOTE: DIMENSIONS NOT SHOWN ARE TO
BE PROVIDED BY STEEL FABRICATOR




8 DETAIL
S-9 | S-13 SCALE = 1 1/2" = 1'0"

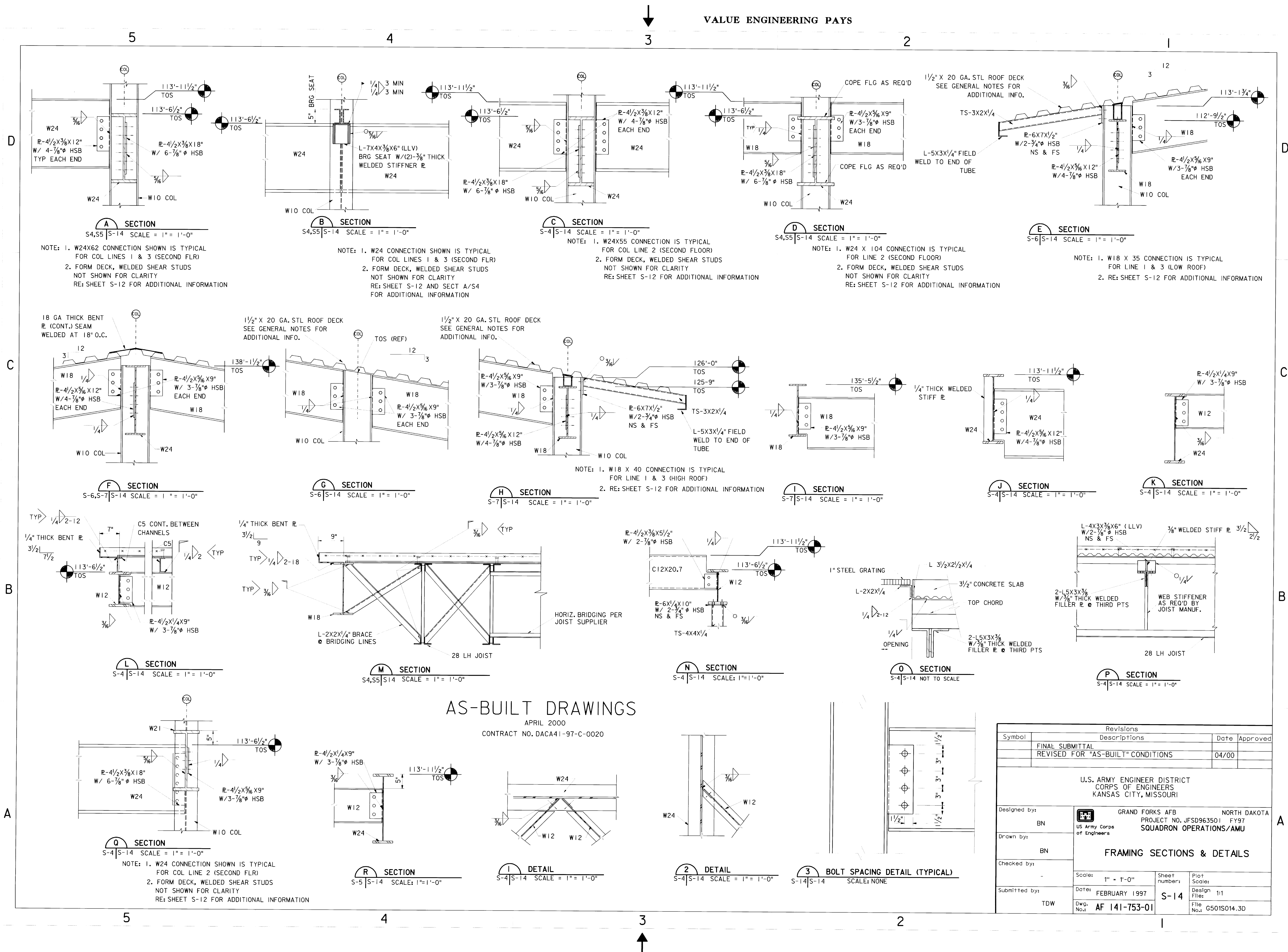
NOTE: DIMENSIONS NOT SHOWN ARE TO
BE PROVIDED BY STEEL FABRICATOR
SEE SHEET S-20 FOR BASE & DETAILS

SEE SHEET S-20 FOR BASE & DETAILS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

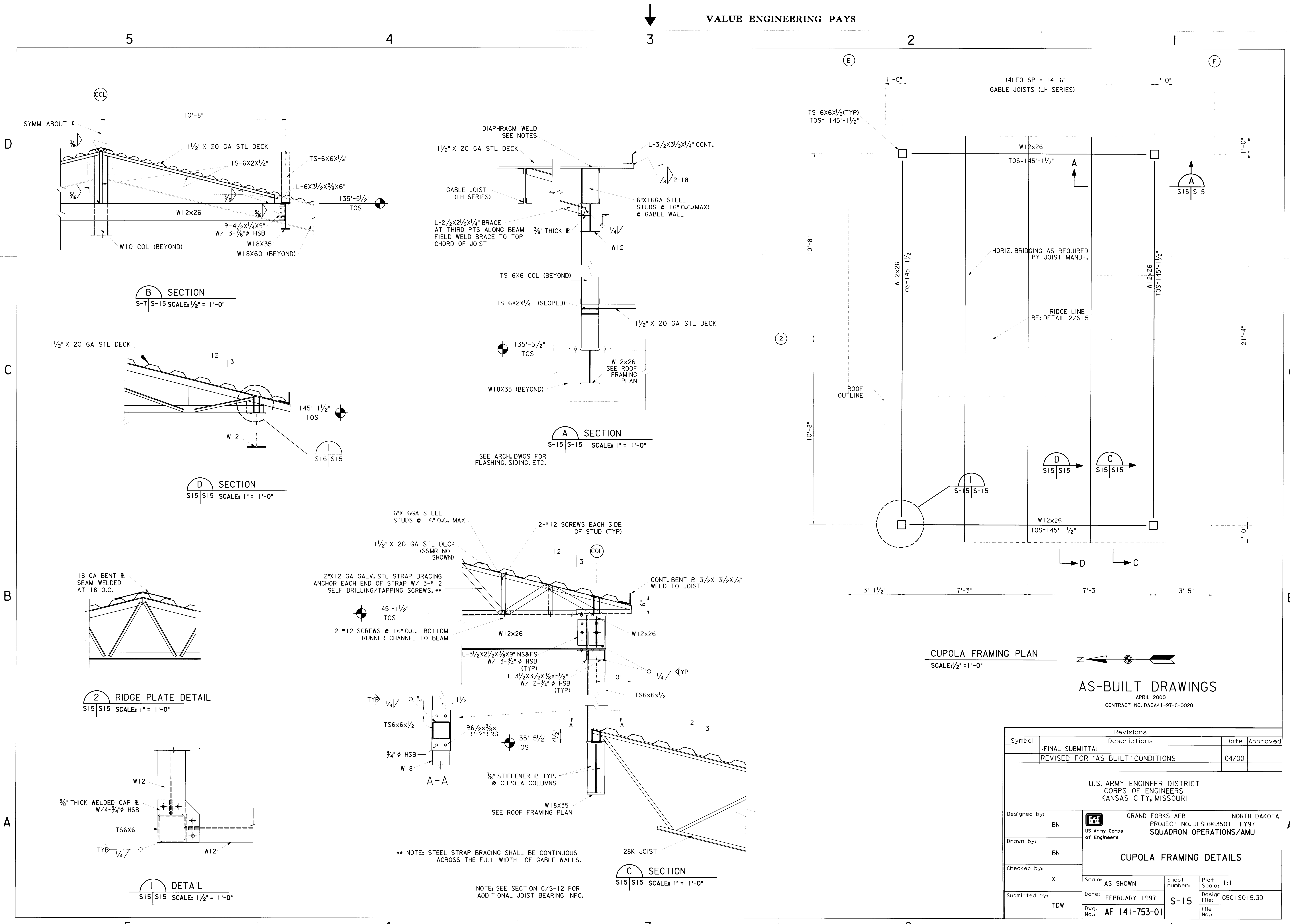
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	 <p align="center">GRAND FORKS AFB PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU</p>	NORTH DAKOTA FY97	
DRA/BN			
Drawn by:	<p align="center">BRACING DETAILS</p>		
DRA/BN			
Checked by:			
-	Scale: 1" = 1'-6"	Sheet number:	Plot Scale: 1:15
Submitted by:	Date: FEBRUARY 1997	S-13	Design File: G50IS013.3D
TOW	Dwg. No.: AF 141-753-01		File No.:

631-00- 156-103 S-13

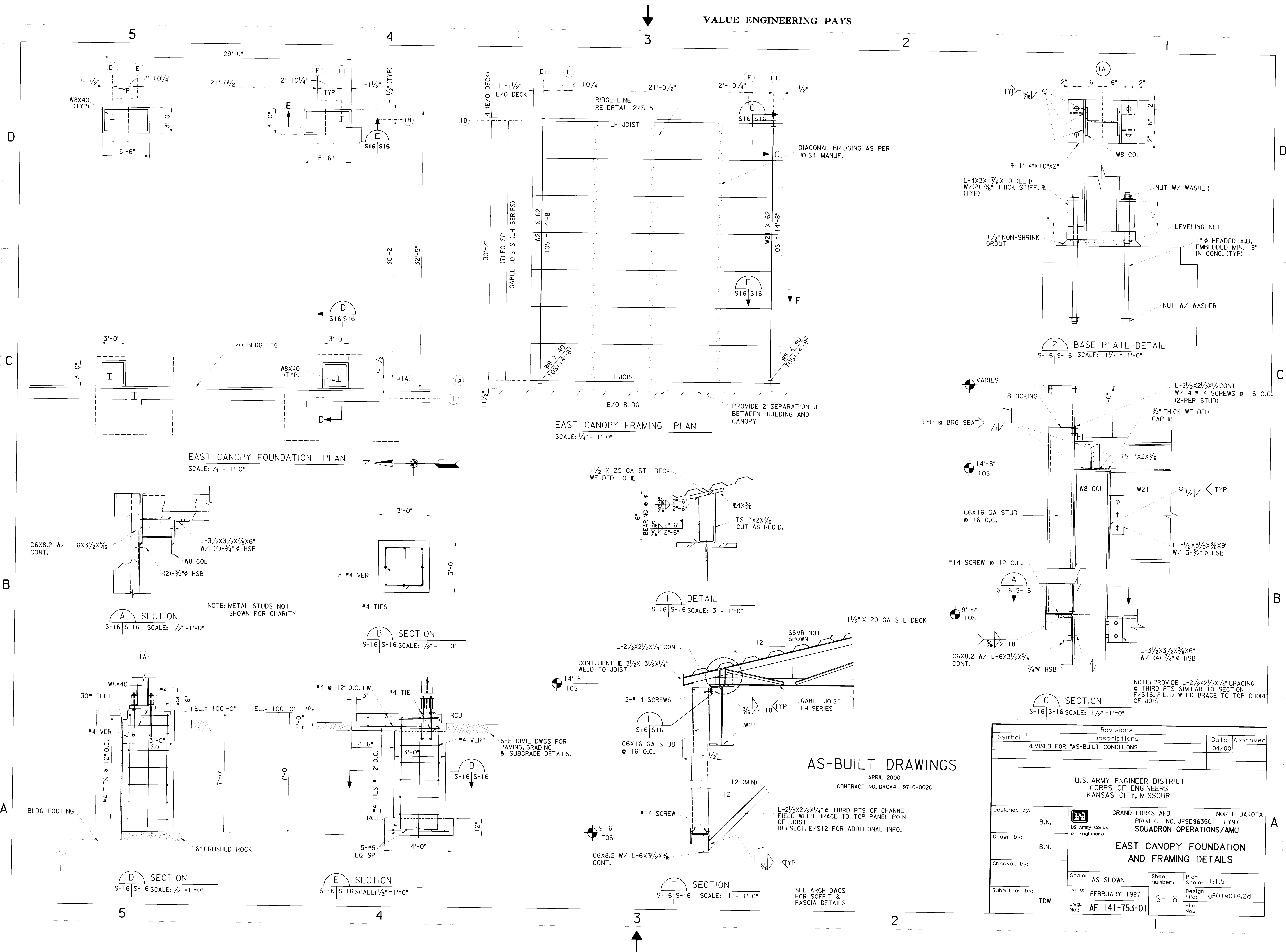


631-00-156-104 S-14

Revisions			
Symbol	Descriptions	Date	Approved
	FINAL SUBMITTAL		
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	BN	GRAND FORKS AFB PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	NORTH DAKOTA
Drawn by:	BN	FRAMING SECTIONS & DETAILS	
Checked by:		Scale: 1" = 1'-0"	Sheet number: S-14
Submitted by:	TDW	Date: FEBRUARY 1997	Plot Scale: 1:1
		Dwg. No.: AF 141-753-01	File No.: G501S014.3D

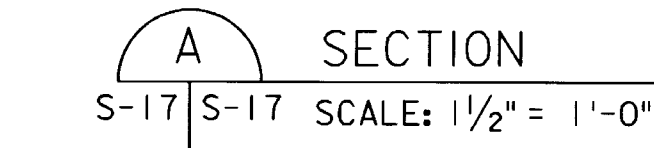


63-000- 156-105 S-15




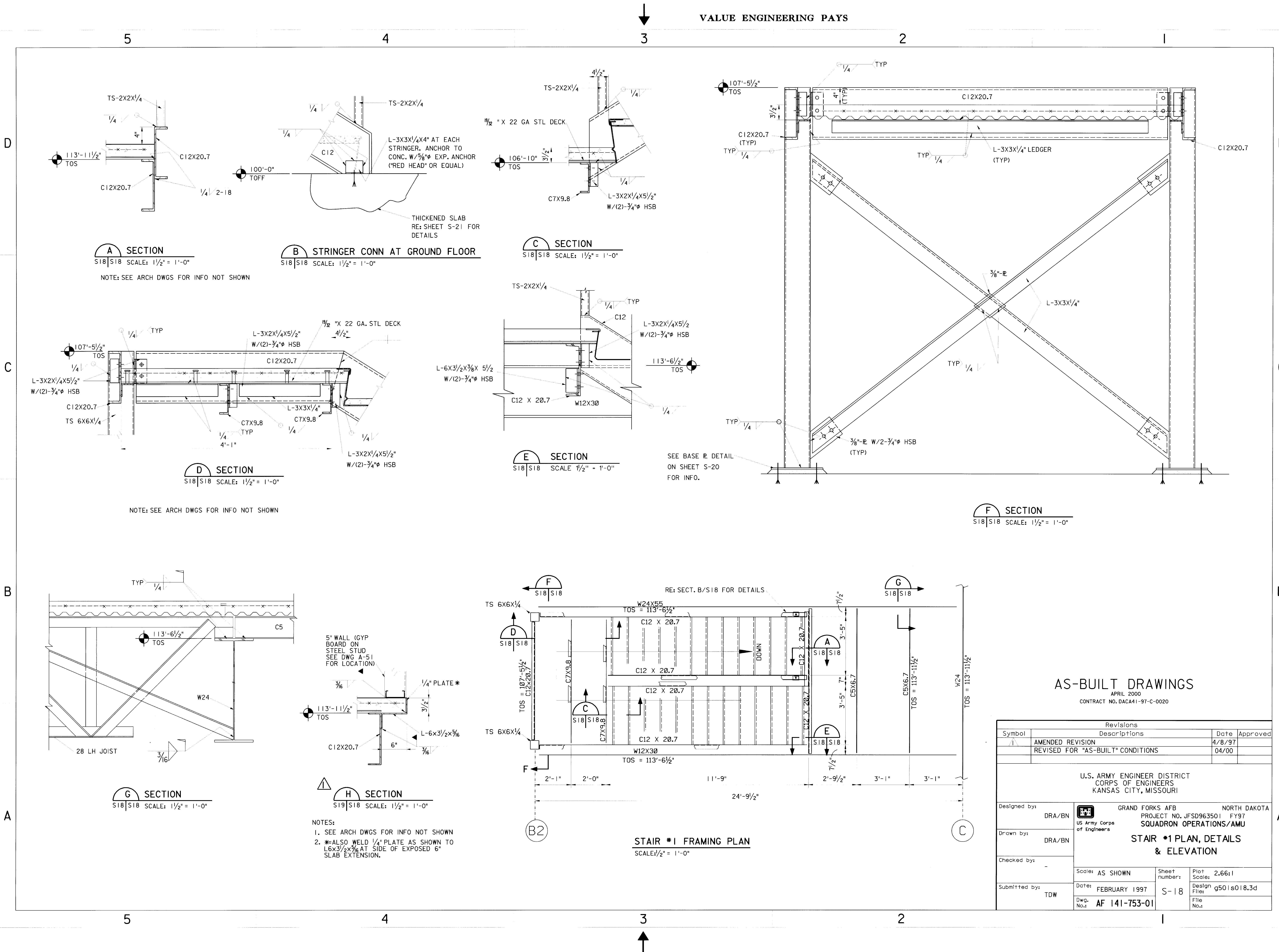
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	B.N.	US Army Corps of Engineers	
Drawn by:	B.N.		
Checked by:			
Submitted by:	TDW		
Scale:	AS SHOWN	Sheet number:	Plot Scale: 1:1.5
Date:	FEBRUARY 1997	Design File:	g501s016.2d
Dwg. No.:	AF 141-753-01	S-16	File No.:

631-000-156-106 S-16



Revisions				
Symbol	Descriptions	Date	Approved	
-	REVISED FOR "AS-BUILT" CONDITIONS	04/00		

<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>				
Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU		
Drawn by:		SIDE CANOPIES FOUNDATION AND FRAMING DETAILS		
Checked by:		-		
Submitted by:	TDW	Date: FEBRUARY 1997 Dwg. No. AF 141-753-01	Sheet number: S-17	Plot Scale: 1:1.5 Design File: g501s017.3d File No.



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
Δ	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	DRA/BN	GRAND FORKS AFB NORTH DAKOTA	
Drawn by:	DRA/BN	PROJECT NO. JFSD963501 FY97	
Checked by:		SQUADRON OPERATIONS/AMU	
Submitted by:	TDW	STAIR #1 PLAN, DETAILS & ELEVATION	
Scale:	AS SHOWN	Sheet number:	2.66:1
Date:	FEBRUARY 1997	File:	g501s018.3d
Dwg. No.:	AF 141-753-01	File No.:	

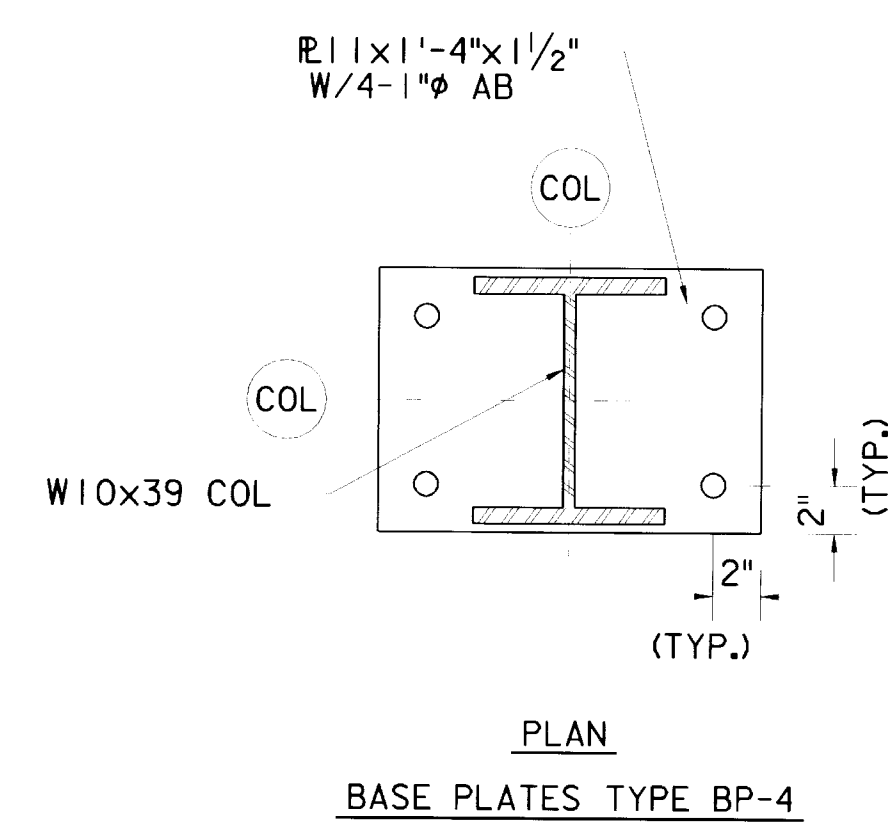
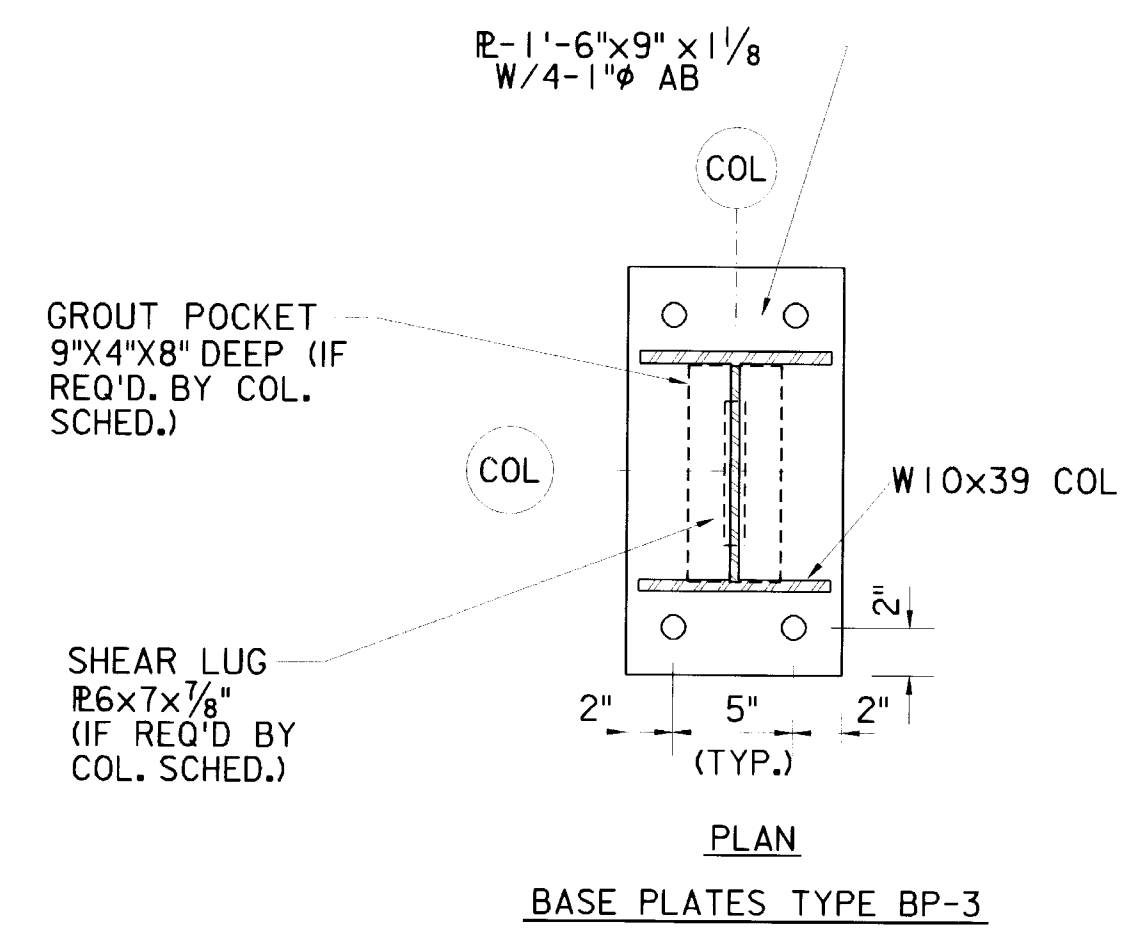
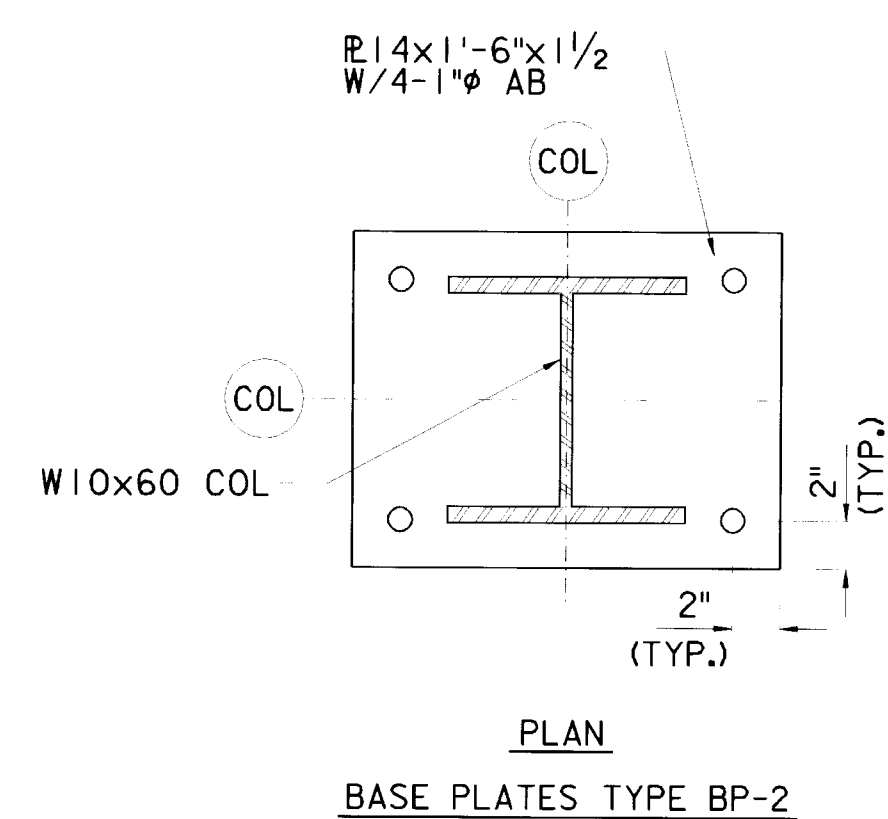
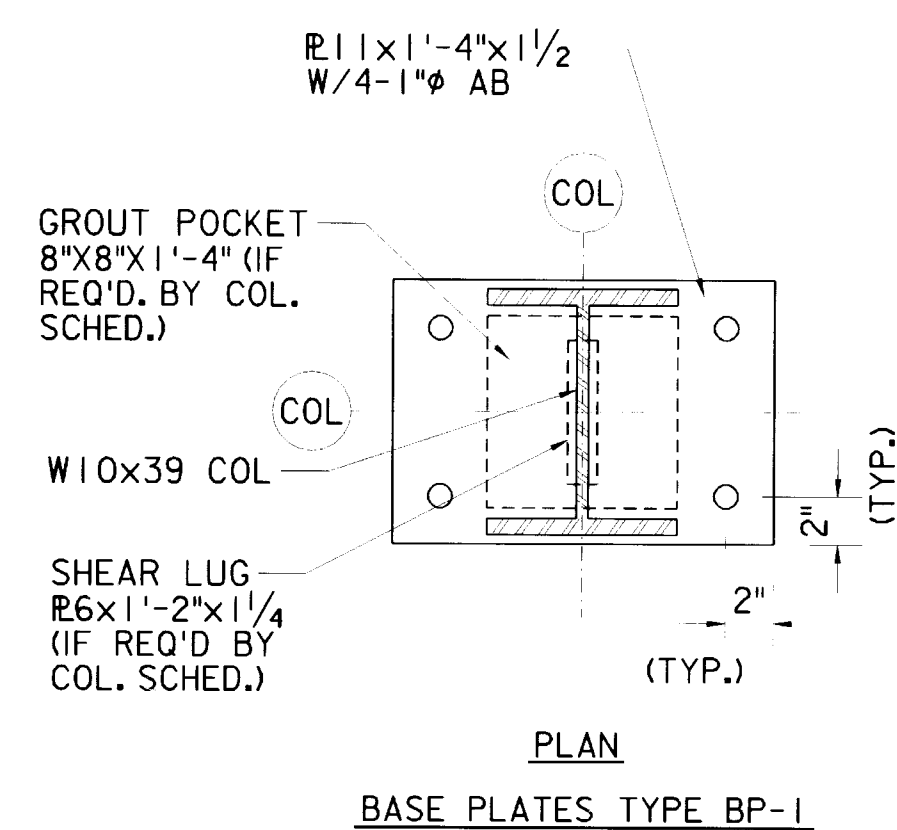
631-000- 156-108 S-18

AS-BUILT DRAWINGS

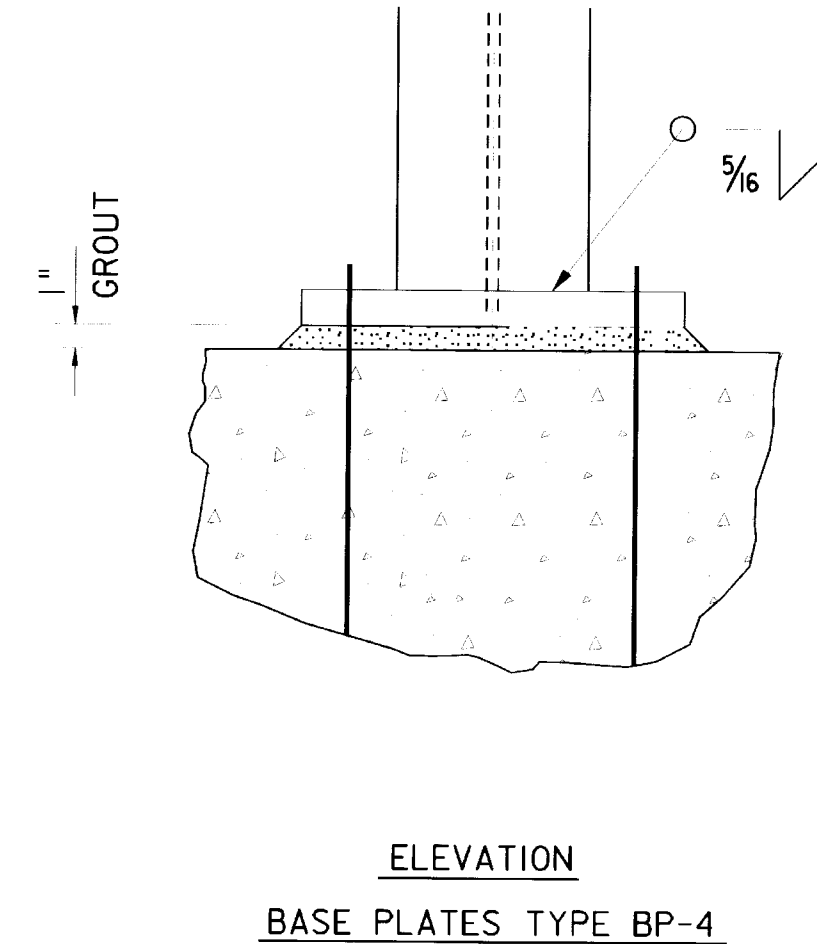
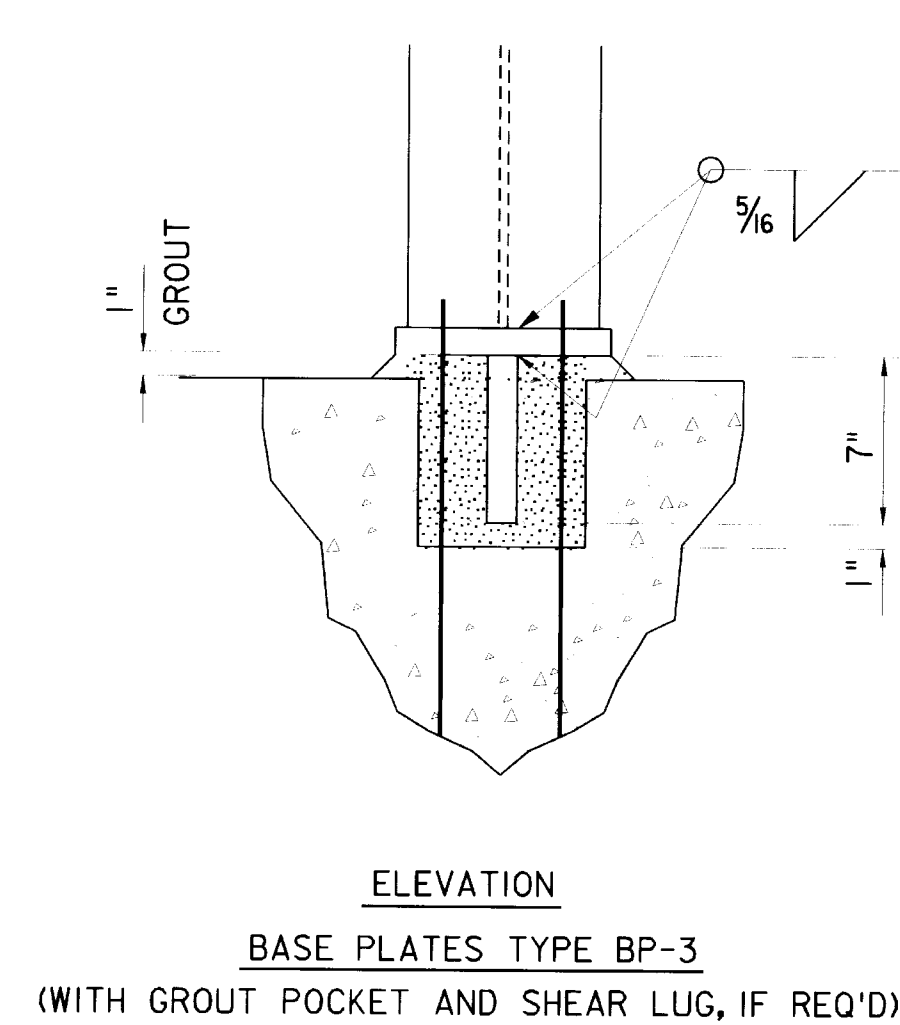
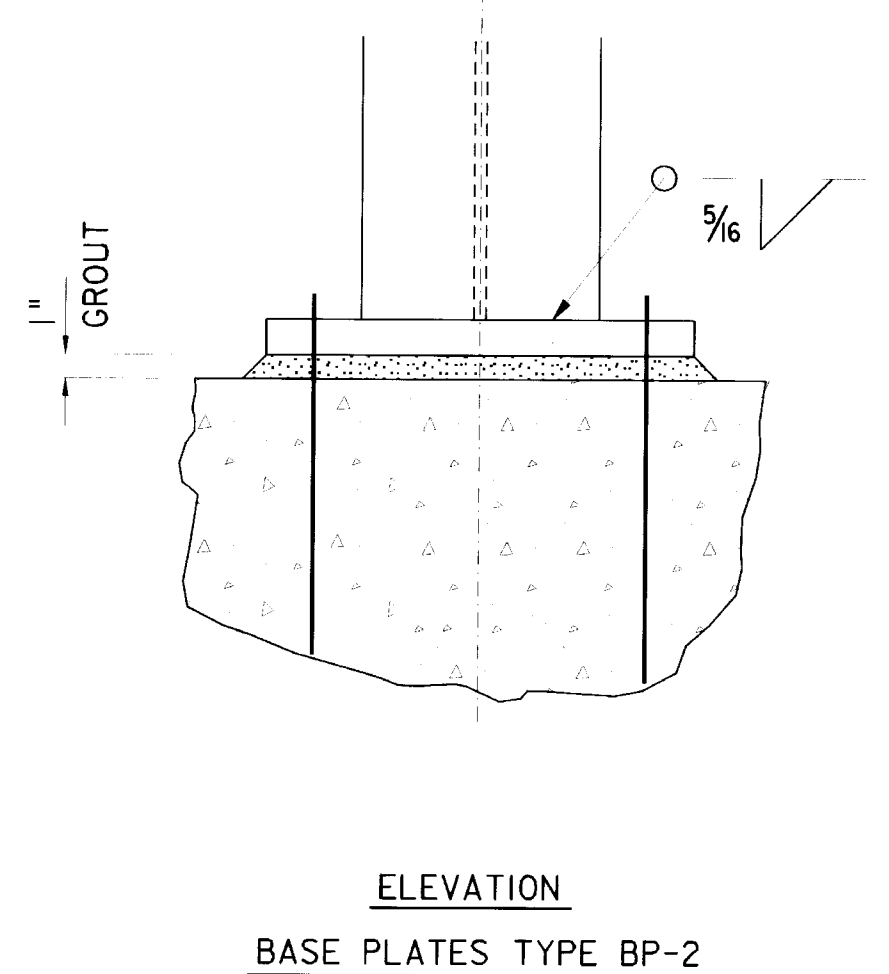
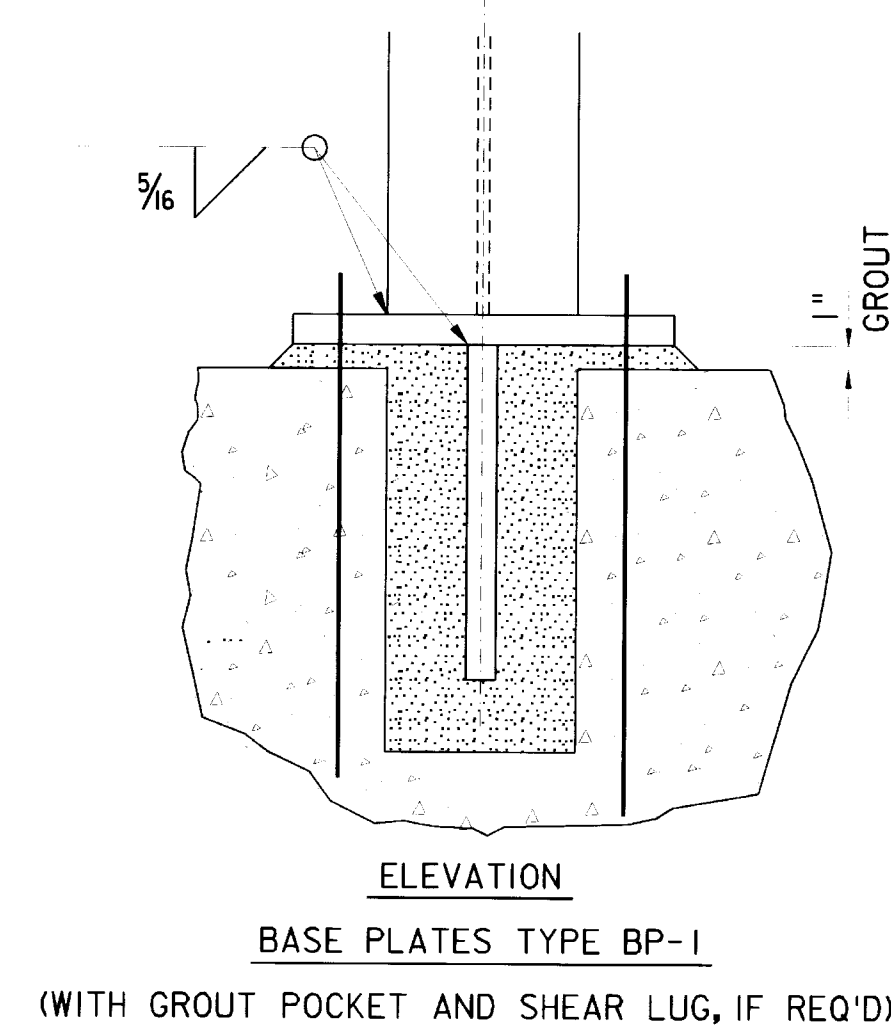
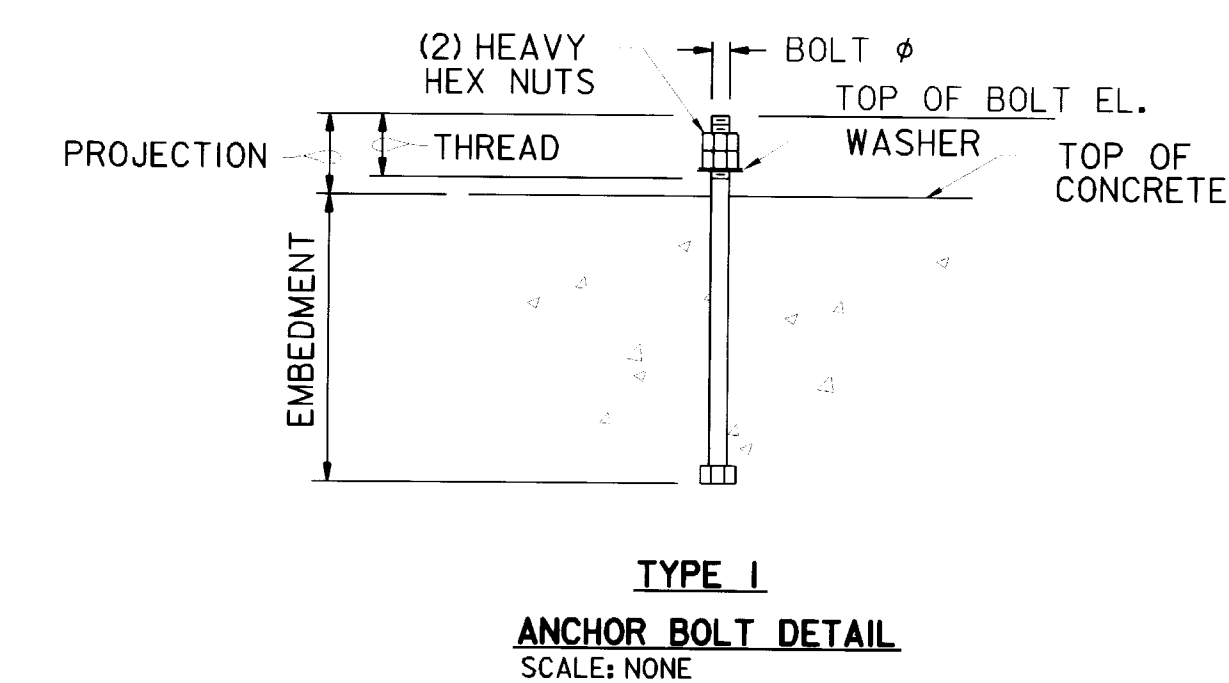
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: DRA	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: DRA	STAIR #2 PLAN, DETAILS & ELEVATION		
Checked by: -	Scale: AS SHOWN	Sheet number: S-19	Plot Scale: 2:1
Submitted by: TDW	Date: FEBRUARY 1997	Design File: g501s019.3d	File No.:
	Dwg. No.: AF 141-753-01		

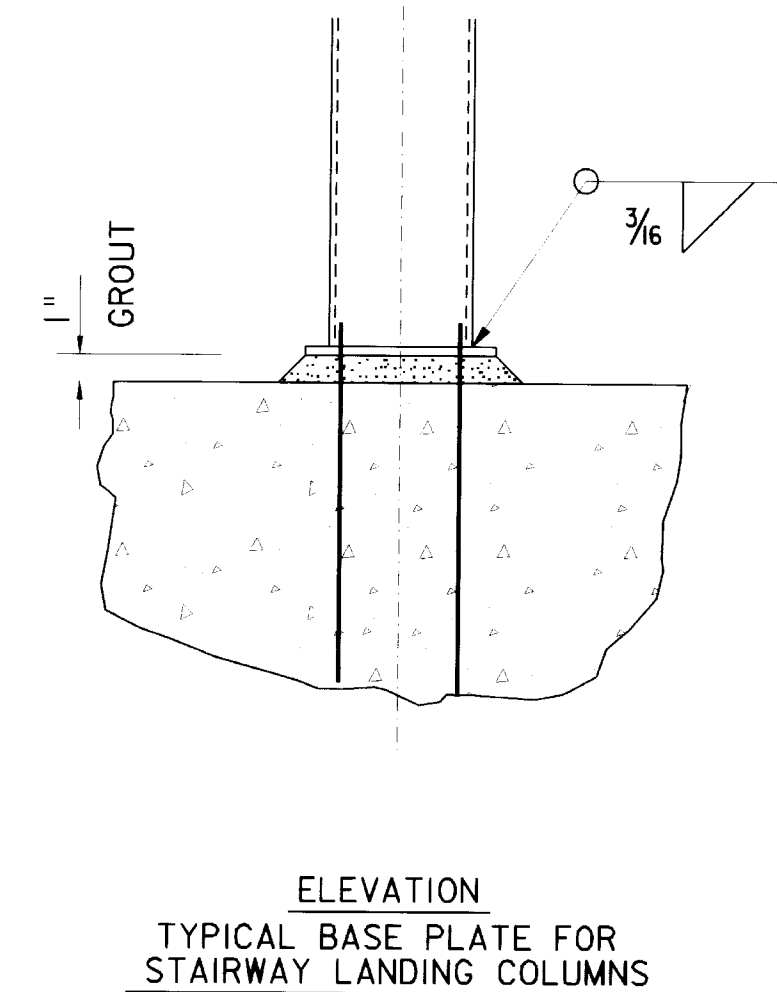
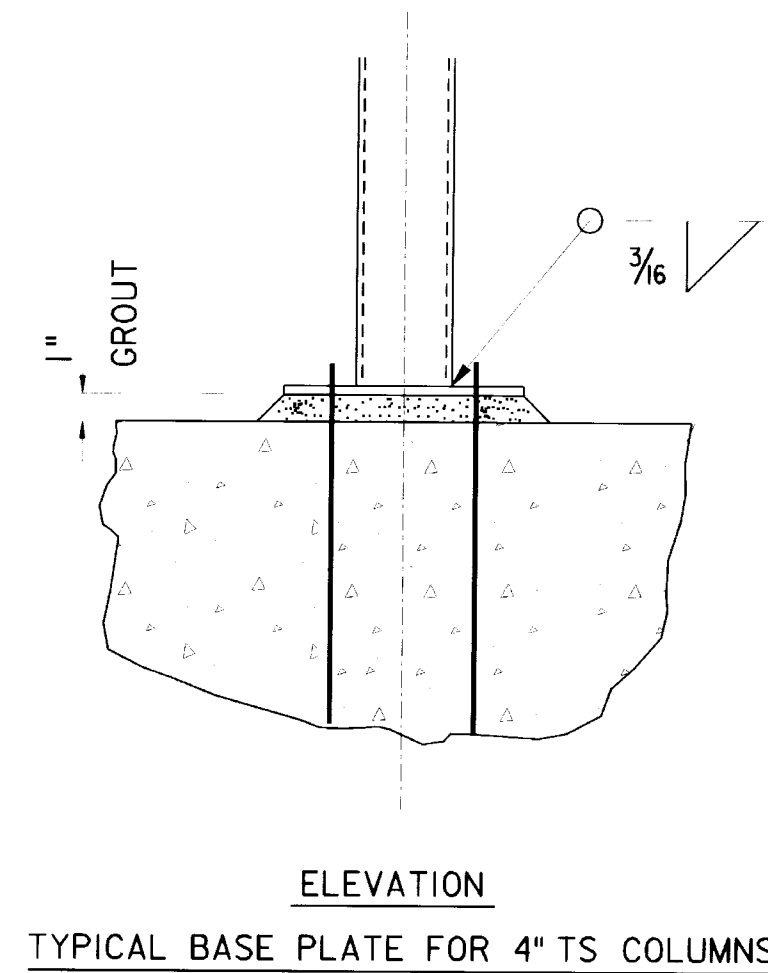
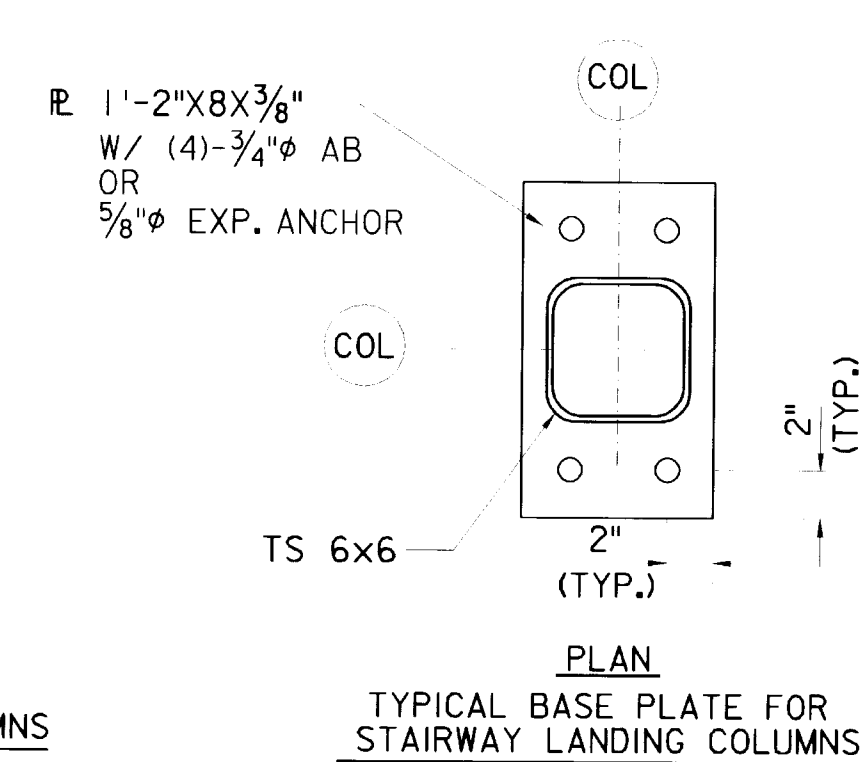
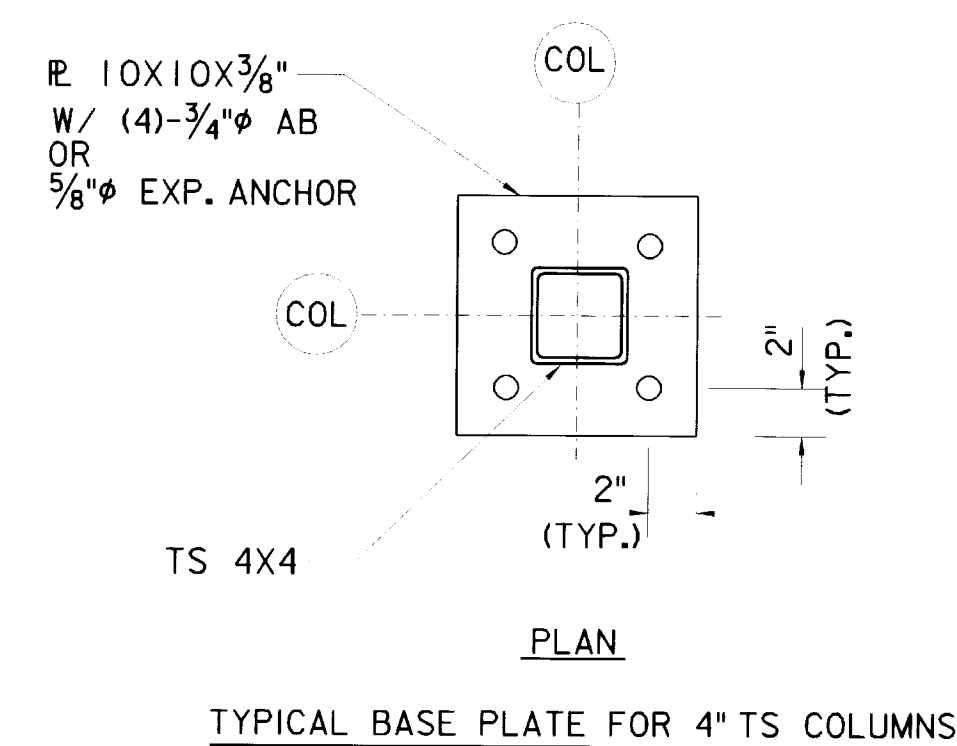
631-000- 156-109 S-19



ANCHOR BOLT SCHEDULE								
MARK	LOCATION	TYPE	PROJ	EMBED- MENT	AB DIA.	LENGTH	THREAD	REMARKS
AB-1	COL. BASES	I	5"	12"	1"	17"	3/2"	GALVANIZE




COLUMN SCHEDULE				
FOOTING LOCATION	MEMBER SIZE	BOT. OF BASE @ ELEV.	BASE @ TYPE	COMMENTS
C-1, D-1, D-3, E-3, G-1, G-3, H-1, H-3	W10X39	100'-1"	BP-1	SHEAR LUG REQ'D
C-2, D-2, E-2, F-2, G-2, H-2	W10X60	99'-5"	BP-2	
B2-1, B2-1.5, B2-2.5, B2-3, I1-1, I1-1.7, I1-2.5, I1-3	W10X39	100'-1"	BP-3	SHEAR LUG REQ'D
A-1.5, A-2, A-2.5, B1-1, B1-1.5, B1-2, B1-2.5, B1-3, B2-2, I1-2, I2-1, I2-1.7, I2-2, I2-2.5, I2-3, J-1.5, J-2, J-2.5	W10X39	100'-1"	BP-3	
A-1, A-3, A.5-1, A.5-3, I.5-1, I.5-3, J-1, J-3 C-3, E-1, F-1, F-3	W10X39	100'-1"	BP-4	
A.5-2 & I.5-2	W10X39	99'-5"	BP-3	



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

		Revisions	
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/700	
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:		COLUMN SCHEDULE, ANCHOR BOLT SCHEDULE, AND DETAILS	
Checked by:		-	
Submitted by:	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Sheet number: S-20 Plot Scale:	Plot Scale: 1:1.5 Design File: G501S020.3D File No:
TOW			

631-00- 156-110 S-20

5

4

3

2

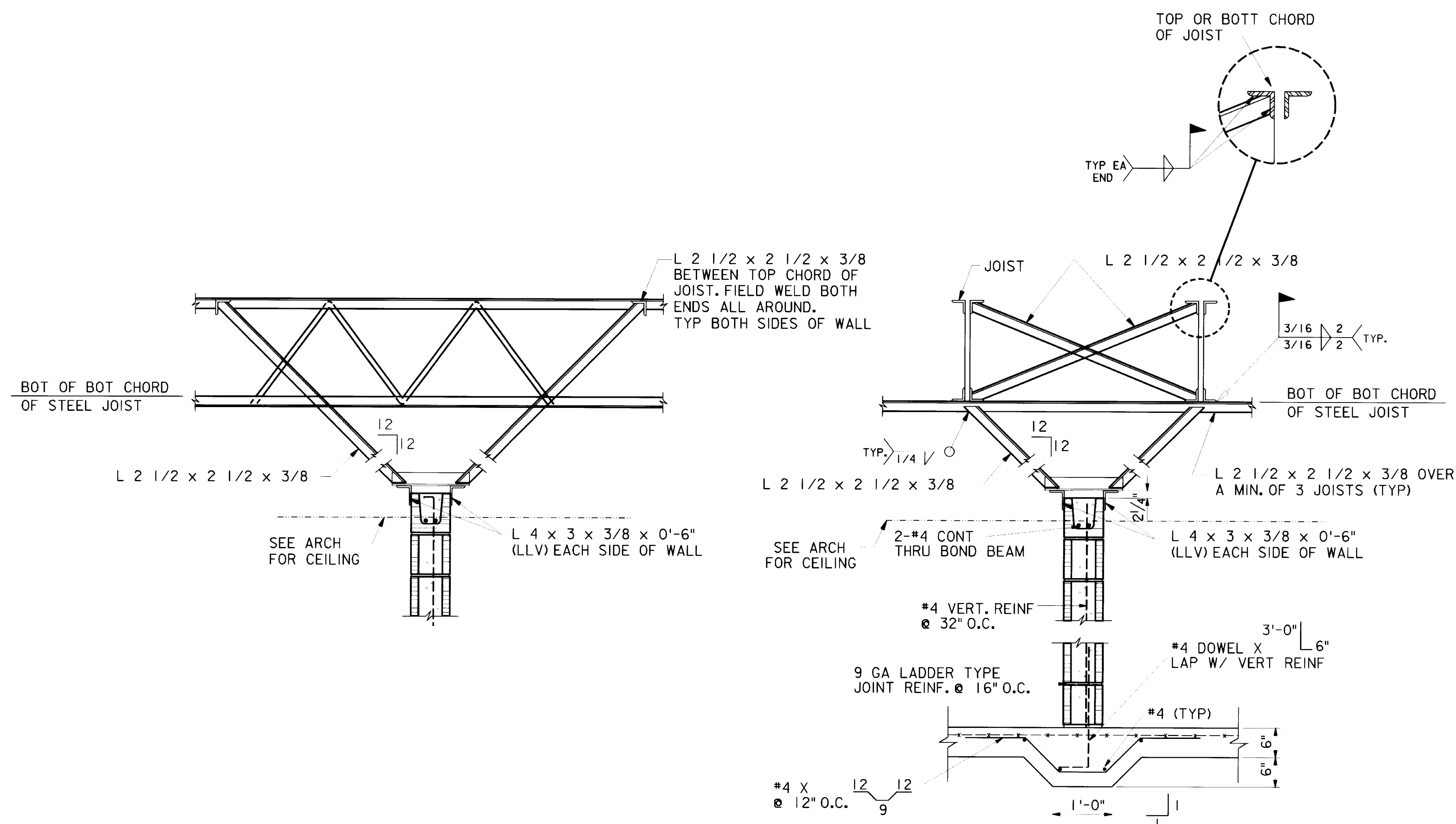
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C

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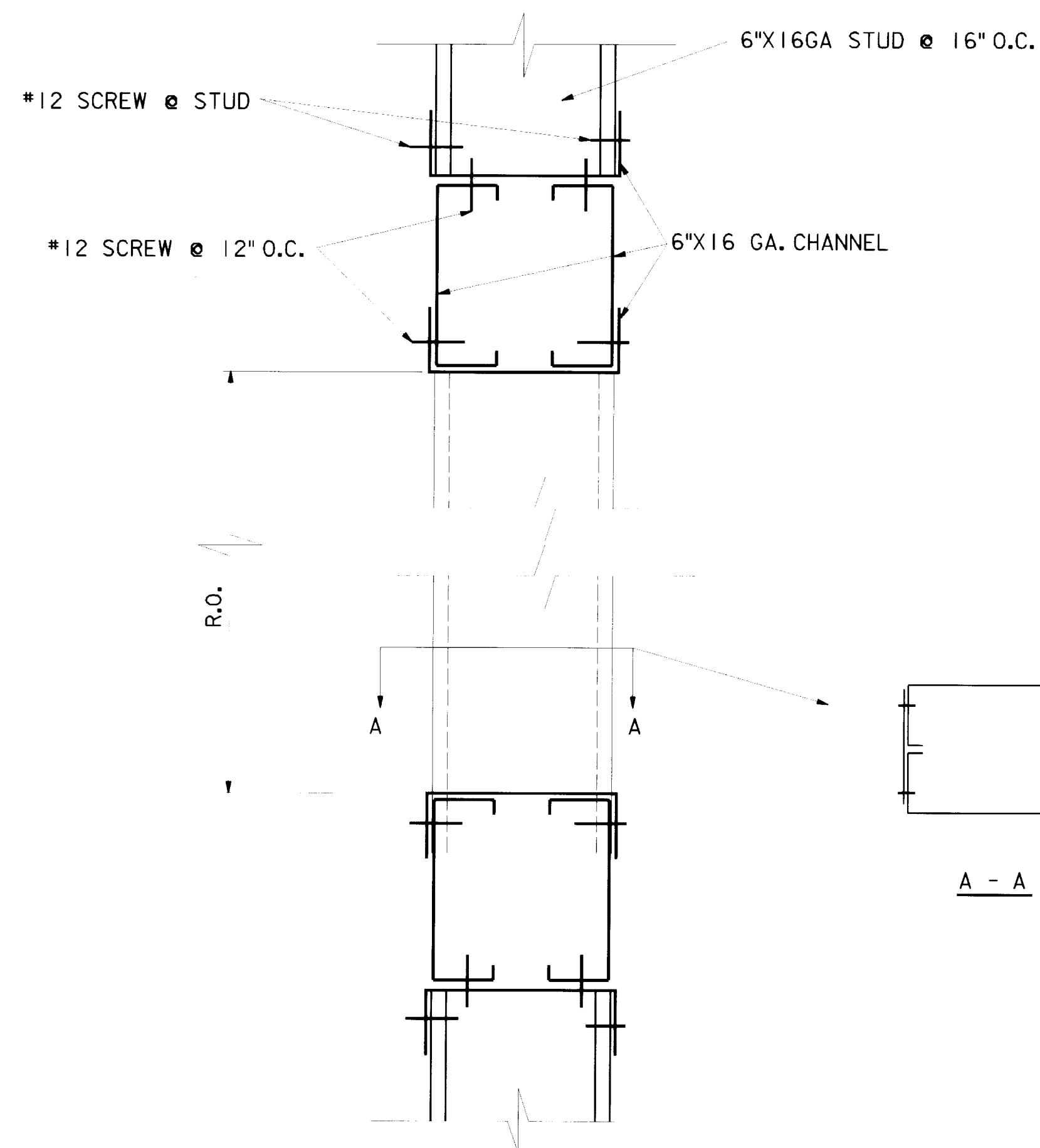


A TYPICAL NON-STRUCTURAL MASONRY WALL DETAIL (WALL PERPENDICULAR TO JOISTS)
S-21 S-21 SCALE: NONE

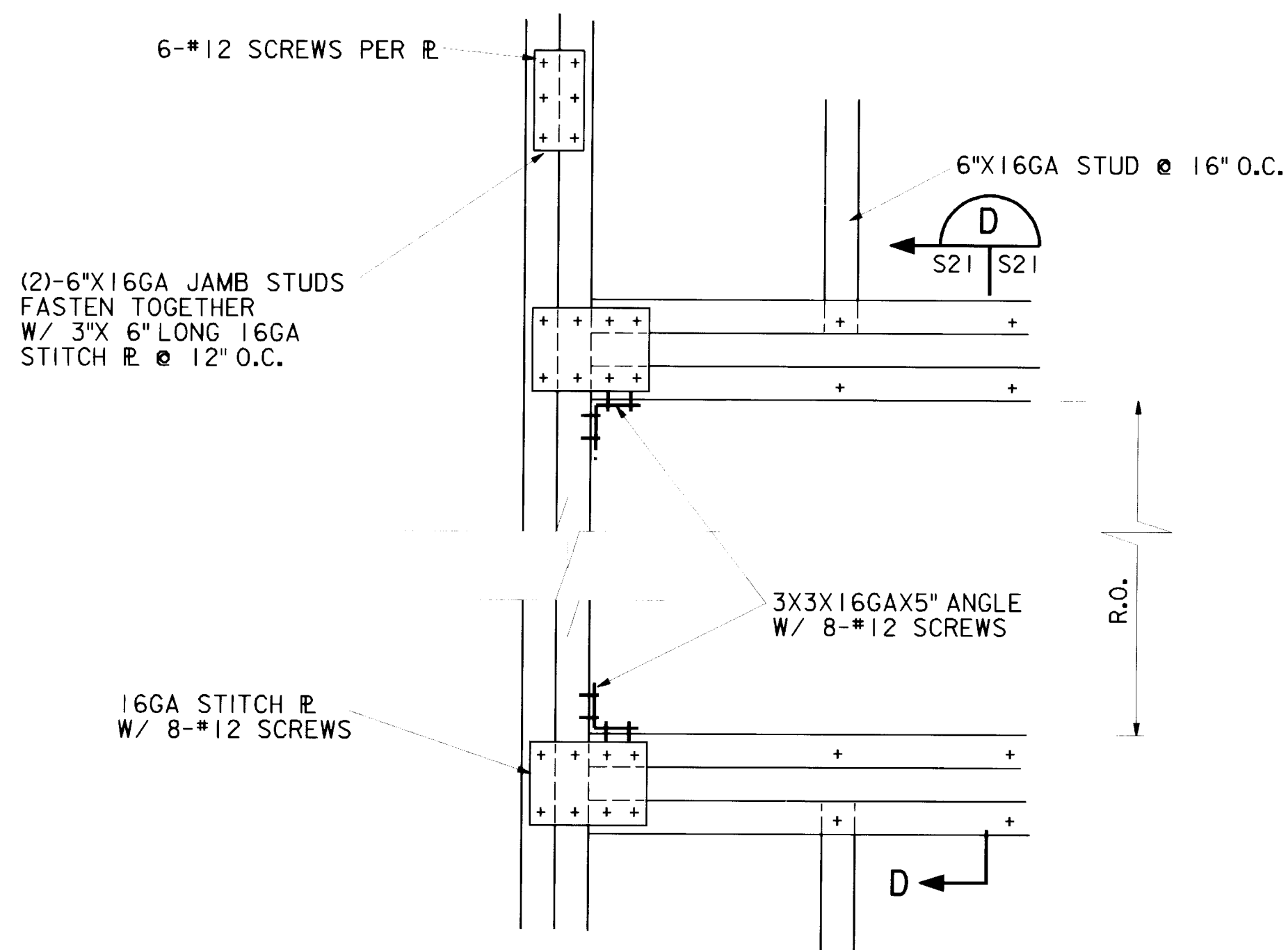
NOTE: MAX SPACING AT 5'-0" O.C.
SEE ADJACENT DETAIL FOR INFO NOT SHOWN

B TYPICAL NON-STRUCTURAL MASONRY WALL DETAIL (WALL PARALLEL TO JOISTS)
S-21 S-21 SCALE: NONE

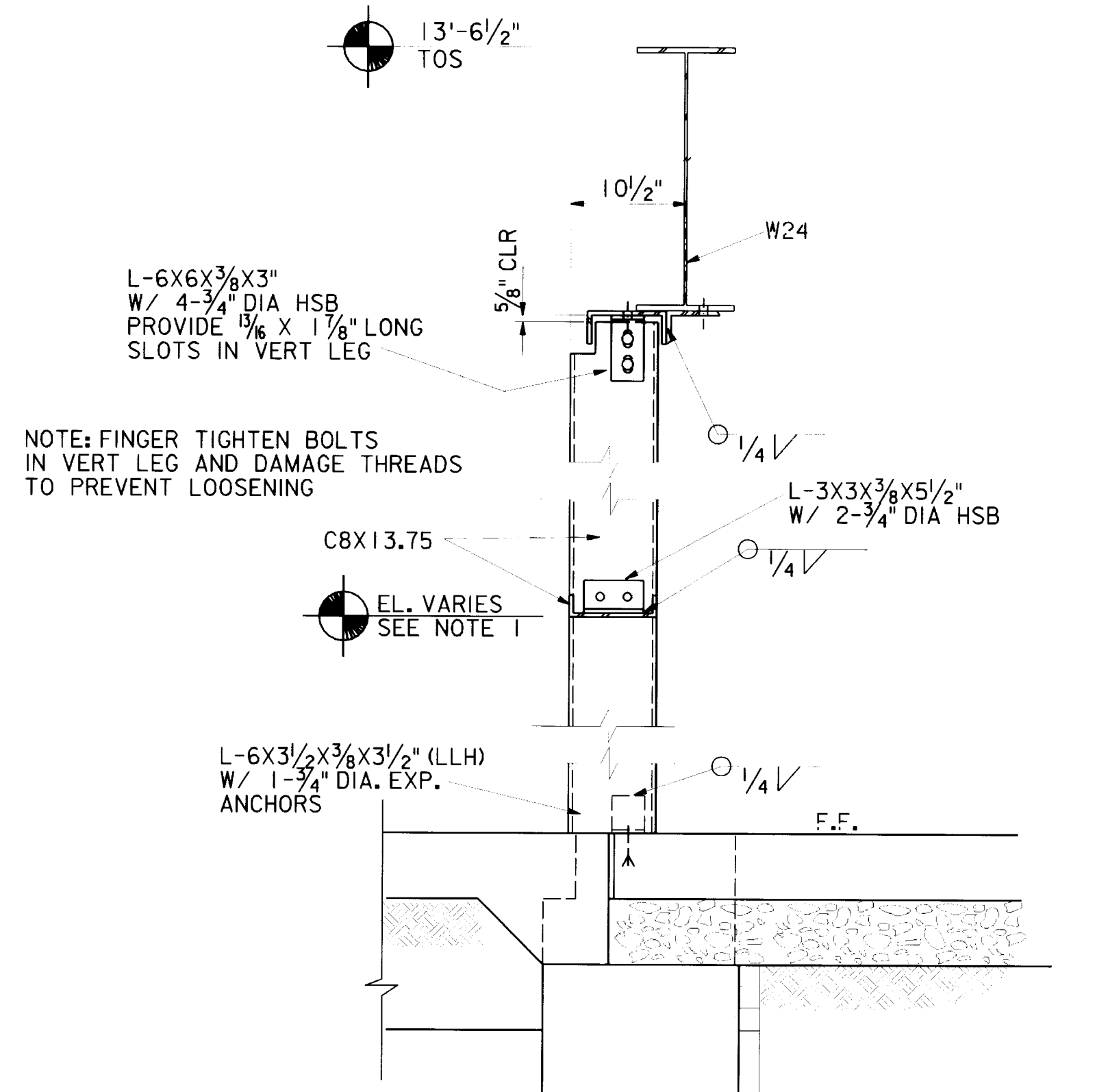
(MAX SPACING AT 5'-0" O.C.)



D EXTERIOR WINDOW FRAMING DETAIL FOR WIDTHS GREATER THAN 10 FEET
S-21 S-21 SCALE: 3" = 1'-0"



I EXTERIOR WINDOW FRAMING DETAIL FOR WIDTHS GREATER THAN 10 FEET (HORIZ)
S-21 S-21 SCALE: 1 1/2" = 1'-0"



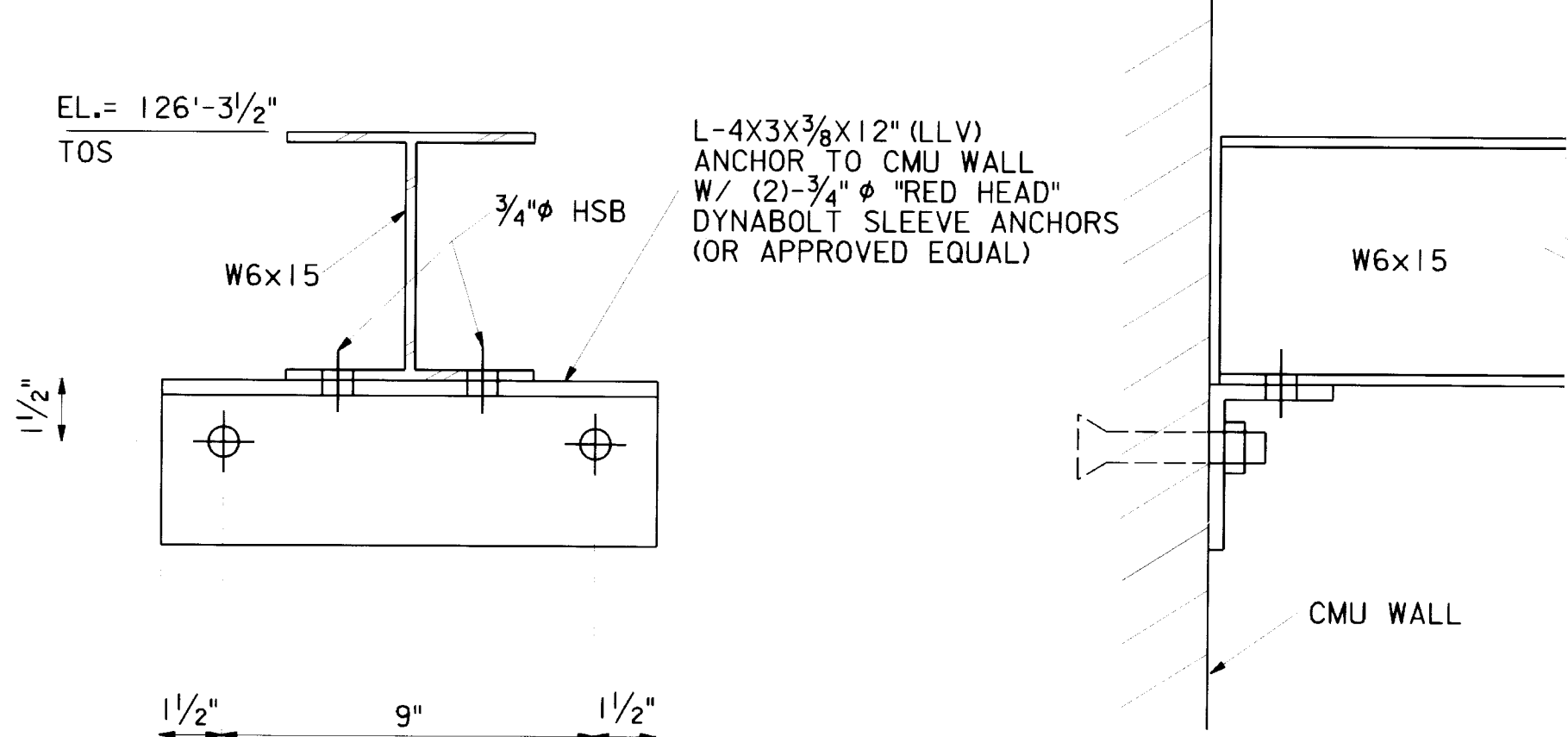
O.H. DOOR NO. 165, 167 & 170- 97 FRAMING MOD

SCALE: 1" = 1'-0"

NOTES: 1. DOOR 165 EL = 10'-0" AFF
DOOR 167 & 170 EL = 14'-0"

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



2 TEMPORARY LIFTING BEAM WALL CONN.

S-22 S-21 SCALE: 3" = 1'-0"

NOTE: DETAILS NOT APPLICABLE FOR TEMPORARY LOADS EXCEEDING 5000 LBS

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	BN	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	BN		
Checked by:	-		
Submitted by:	TDW		
Scale: AS SHOWN		Sheet number: S-21	Plot Scale: 2:1
Date: FEBRUARY 1997		Design File: g501s021.3d	
Dwg. No.: AF 141-753-01		File No.:	

5

4

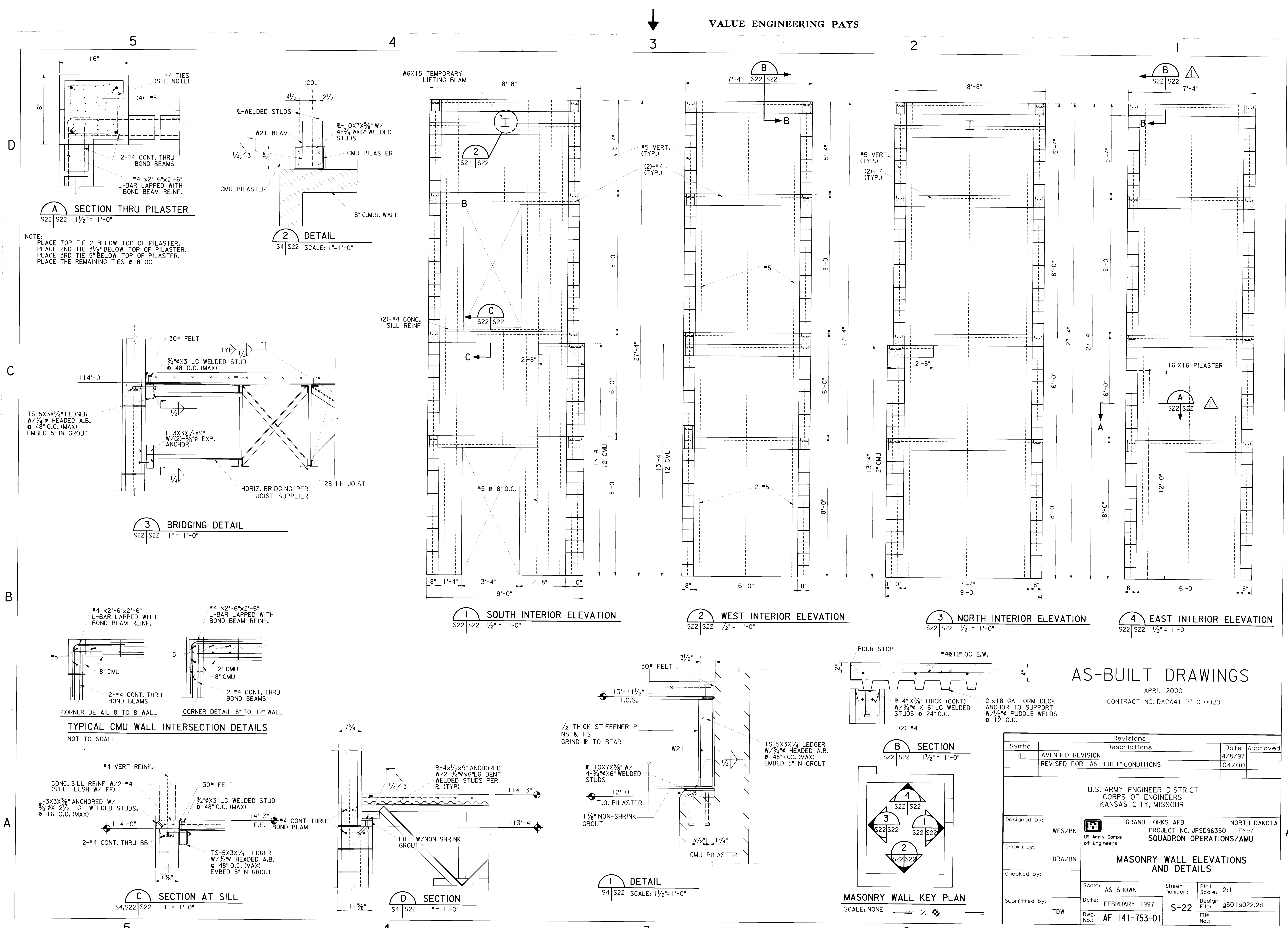
3

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1

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631000-156-111 S-21



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
1	AMENDED REVISION	4/8/97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	WFS/BN	Grand Forks AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	DRA/BN	MASONRY WALL ELEVATIONS AND DETAILS	
Checked by:	-	Scale: AS SHOWN	Sheet number: 2 of 1
Submitted by:	TDW	Date: FEBRUARY 1997	Design File: g501s022.2d
Dwg. No.:	AF 141-753-01	S-22	File No.:

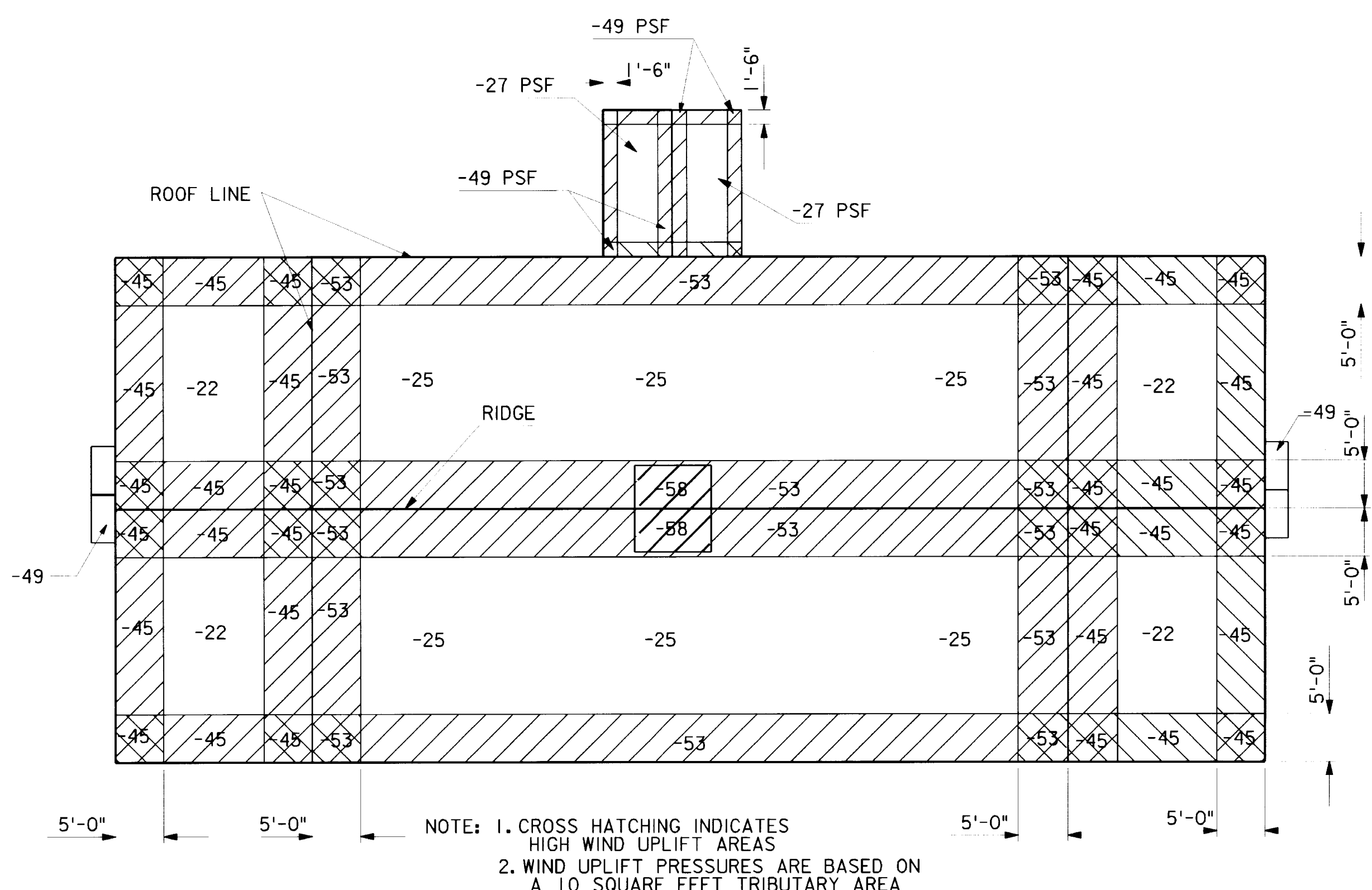
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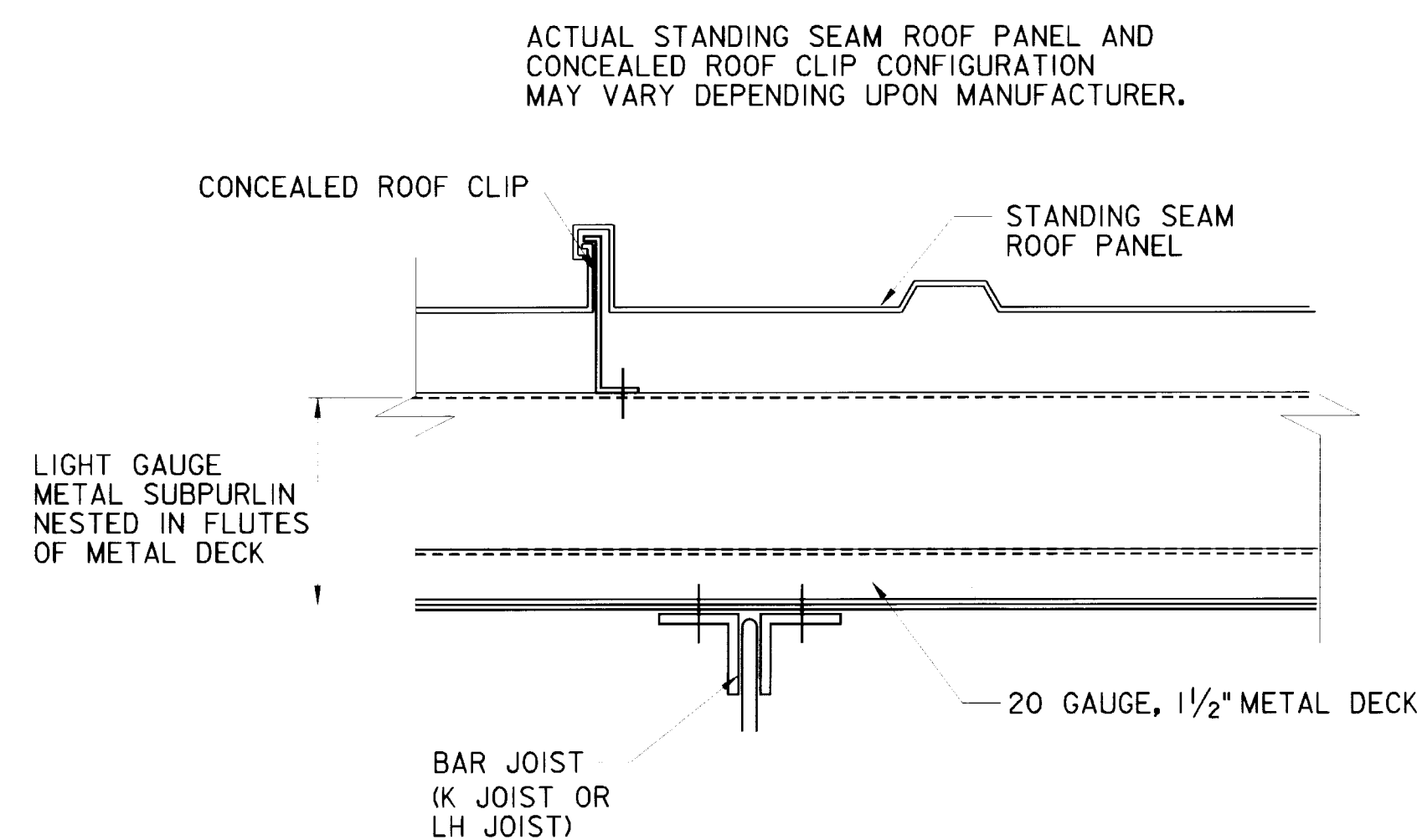
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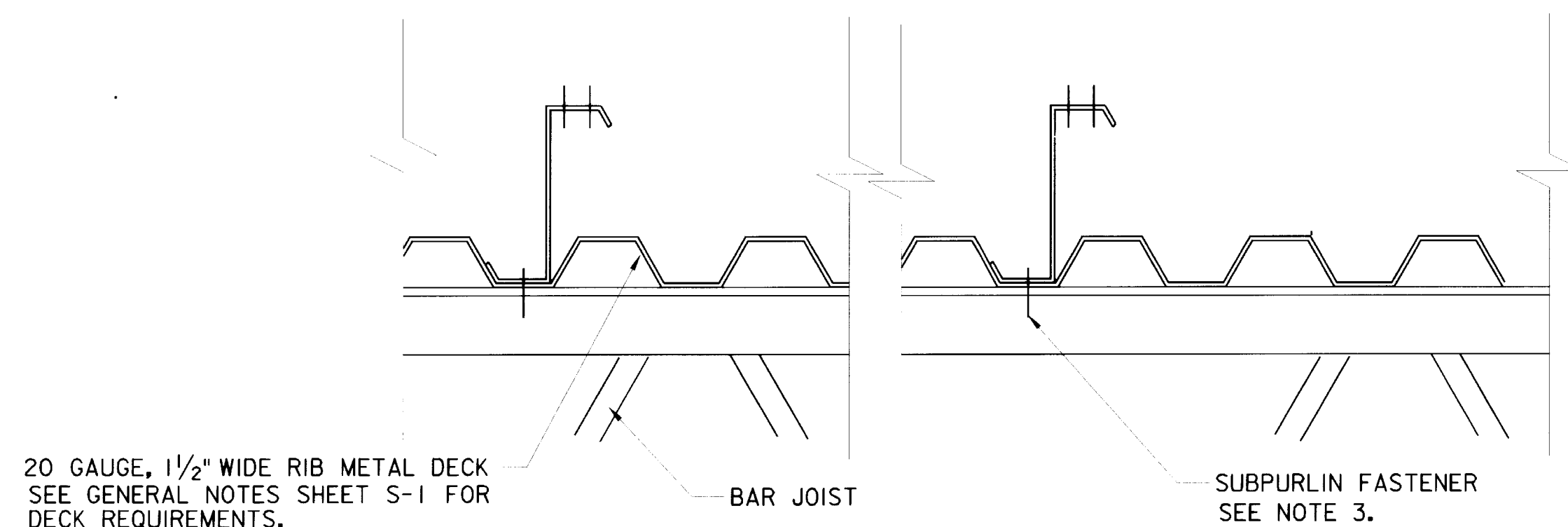


WIND UPLIFT PRESSURES (PSF) FOR ROOF COMPONENT DESIGN
NOT TO SCALE



ROOF PANEL SECTION
S-23 | S-23 SCALE: 3" = 1'-0"

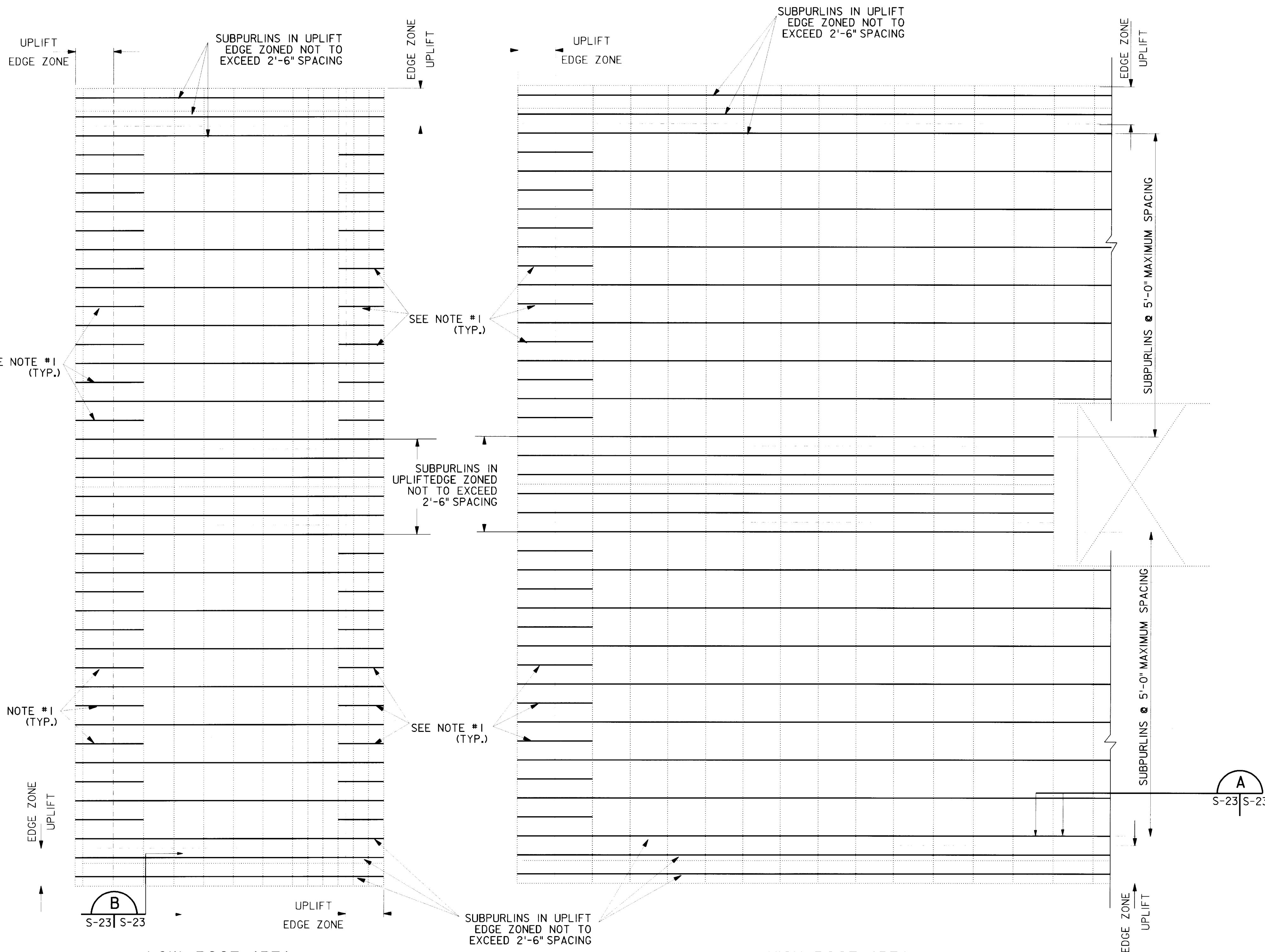
STANDING SEAM METAL ROOFING SYSTEM NOT SHOWN FOR CLARITY.



TYPICAL SECTION
S-23 | S-23 SCALE: 3" = 1'-0"

NOTES:

- ADDITIONAL SUBPURLINS SHALL SPAN TO AND BEAR ON FIRST JOIST OUTSIDE OF LOADING ZONE "2" AS SHOWN. DO NOT CANTILEVER SUBPURLINS OVER JOISTS.
- SUBPURLINS = LIGHT GAUGE METAL Z PURLIN TO BE MINIMUM 14 GAUGE THICKNESS AND 6" DEPTH. SUBPURLINS TO BE LOCATED IN THE FLUTES OF THE METAL DECK AT A MAXIMUM SPACING ON THIS SHEET. MINIMUM SECTION PROPERTIES TO BE $I_x = 4.0 \text{ IN}^4$ & $S_x = 1.0 \text{ IN}^3$.
- MINIMUM FASTENER REQUIREMENTS FOR SUBPURLINS ARE 2 - #12-14 THREAD PER INCH SCREWS AT EACH JOIST WITH #12-14 SCREWS @ 12" O.C. MAXIMUM SPACING BETWEEN ATTACHMENTS TO STRUCTURAL SUPPORTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF THE STANDING SEAM METAL ROOF SYSTEM, INCLUDING FRAMING SYSTEM, WITH THE METAL DECK AND ALL CONNECTIONS. SEE SPECIFICATION SECTIONS 05300 AND 07416 FOR ADDITIONAL INFORMATION.



LOW ROOF AREA

TYPICAL SUBPURLIN FRAMING PLAN
SCALE: 1/8" = 1'-0"

HIGH ROOF AREA

AS-BUILT DRAWINGS

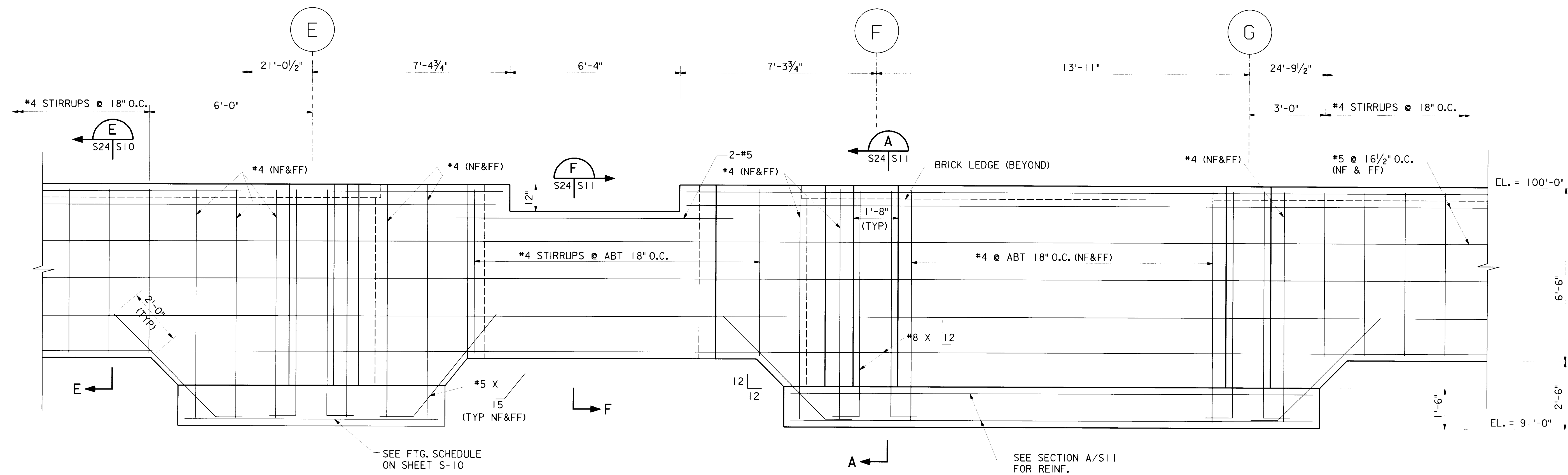
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	BN/WFS	Grand Forks AFB NORTH DAKOTA	
Drawn by:	JAC/BN	PROJECT NO. JFSD963501 FY97	
Checked by:		SQUADRON OPERATIONS/AMU	
Submitted by:	TOW	WIND UPLIFT AND ROOF DIAGRAMS	
Scale: 1/8" = 1'	Sheet number: S-23	Plot Scale: 8:1	
Date: FEBRUARY 1997	Dwg. No.: AF 141-753-01	Design File: G501S023.3D	
		File No.:	

63100-

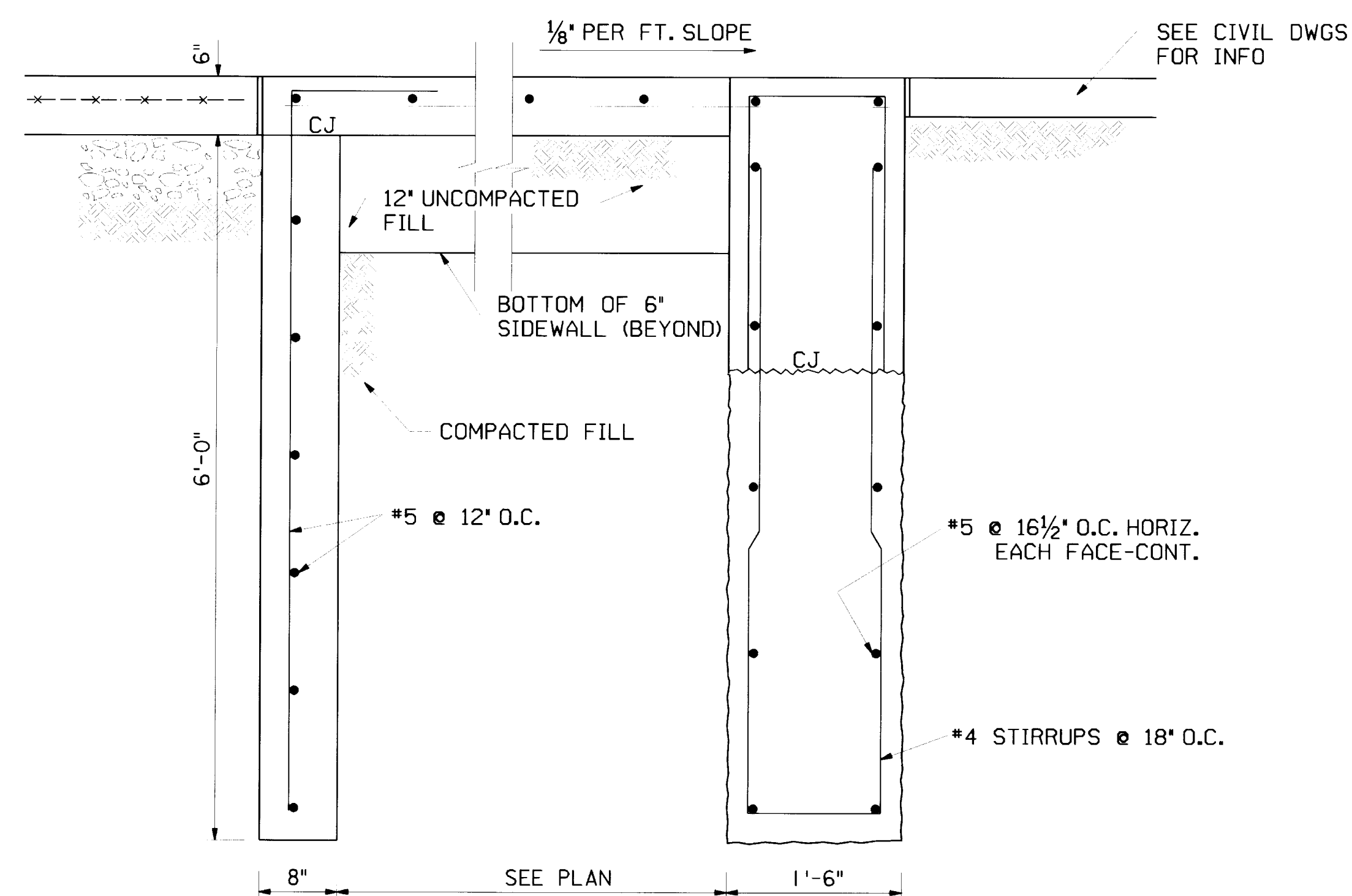
156-113

S-23



1 PARTIAL GRADE BEAM ELEVATION @ COL LINE I
S3 | S24 SCALE: 1/2" = 1'-0"

NOTE: TRANSVERSE FOOTING REINF NOT SHOWN.
SEE SHEETS S-10 & S-11 FOR INFO.



A SECTION AT EXT DOOR
S2, S3 | S24 SCALE: 1" = 1'-0"

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	BN		
Checked by:	X		
Submitted by:	TDW		
Scale:	AS SHOWN	Sheet number:	Plot Scale: 1:1
Date:	FEBRUARY 1997	S-24	Design File: 6501S024.3D
Dwg. No.:	AF 141-753-01	File No.:	

631000- 156-114 S-24

GENERAL NOTES

1. ALL HVAC COMPONENTS IN FINISHED ROOMS, EXCEPT THERMOSTATS, SHALL BE INSTALLED ABOVE THE CEILING, IN CHASES OR CONCEALED IN WALLS EXCEPT WHERE OTHERWISE SHOWN OR SPECIFIED.
2. EQUIPMENT AND HVAC COMPONENTS SHALL BE INSTALLED WITH ADEQUATE CLEARANCE TO PERMIT ACCESS FOR OPERATION AND MAINTENANCE.
3. ACCESS PANELS SHALL BE PROVIDED FOR ALL CONCEALED EQUIPMENT INSTALLED ABOVE NON-ACCESSIBLE CEILINGS.
4. CONTRACTOR SHALL COORDINATE HVAC DUCTWORK AND EQUIPMENT INSTALLATION SO THAT THEY DO NOT PASS THROUGH DESIGNATED ELECTRICAL SPACES AS REQUIRED BY THE NATIONAL ELECTRICAL CODE.
5. ALL OPENINGS THROUGH FIRE RATED WALLS SHALL BE FIRESTOPPED IN ACCORDANCE WITH THE SPECIFICATIONS.
6. ALL DUCTWORK UPSTREAM OF TERMINAL UNITS SHALL BE CONSTRUCTED TO SMACNA 4" W.G. PRESSURE CLASSIFICATION. ALL RIGID DUCTWORK DOWNSTREAM OF TERMINAL UNITS SHALL BE CONSTRUCTED TO SMACNA 0.5" W.G. PRESSURE CLASSIFICATION. ALL RIGID DUCTWORK SHALL BE SEALED TO SMACNA SEAL CLASS A REQUIREMENTS.
7. RUN-OUTS DRAWN DOUBLE-LINE SHALL BE RIGID, RUN-OUTS DRAWN SINGLE LINE SHALL BE FLEXIBLE.
8. WHERE SPACE PERMITS, PROVIDE FOUR LINEAR FEET OF FLEXIBLE DUCT AT INLET OF EACH TERMINAL UNIT.
9. EXCEPT FOR RUN-OUTS, WHERE A DUCT SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE DUCT SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED. RIGID AND FLEXIBLE RUN-OUT SIZES NOT SHOWN SHALL BE MINIMUM EQUAL TO THE INLET DIAMETER OF THE DEVICE TO WHICH THE DUCT IS CONNECTED.
10. COORDINATE DUCT ELEVATIONS WITH OTHER DUCTWORK, CABLE TRAY, LIGHTS, BUILDING STRUCTURE AND OTHER TRADES TO INSURE THAT CEILING HEIGHTS SHOWN ON THE INTERIOR FINISH SCHEDULE ARE MAINTAINED. ACCESS TO CABLE TRAY SHALL BE MAINTAINED AND ALL OPERABLE DUCTWORK DEVICES SHALL BE ACCESSIBLE.
11. FLEXIBLE DUCT BENDS SHALL HAVE A CENTERLINE RADIUS OF NOT LESS THAN 1 DUCT DIAMETER. DUCTS SHALL BE SUPPORTED WITH MAXIMUM 1/2" PER FOOT SAG BETWEEN SUPPORTS.

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TYPICAL CHILLED WATER COIL DETAIL.....	C	M-5
TYPICAL AHU-3 REHEAT COIL DETAIL.....	D	M-5
TYPICAL HORIZ. PROPELLER UNIT HEATER DETAIL.....	E	M-5
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Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	HVAC PLAN FIRST FLOOR	
Checked by:	JBT	Scale: 3/8" = 1'	Sheet number: Plot Scale: 1:63
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501M001.3D
		Dwg. No.: AF 141-753-01	File No.:

FIRST FLOOR HVAC PLAN
SCALE: 3/8" = 1'-0"

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

631-000- 156-115 M-1

GENERAL NOTES

1. ALL HVAC COMPONENTS IN FINISHED ROOMS, EXCEPT THERMOSTATS, SHALL BE INSTALLED ABOVE THE CEILING, IN CHASES OR CONCEALED IN WALLS EXCEPT WHERE OTHERWISE SHOWN OR SPECIFIED.
2. EQUIPMENT AND HVAC COMPONENTS SHALL BE INSTALLED WITH ADEQUATE CLEARANCE TO PERMIT ACCESS FOR OPERATION AND MAINTENANCE.
3. ACCESS PANELS SHALL BE PROVIDED FOR ALL CONCEALED EQUIPMENT INSTALLED ABOVE NON-ACCESSIBLE CEILINGS.
4. CONTRACTOR SHALL COORDINATE HVAC DUCTWORK AND EQUIPMENT INSTALLATION SO THAT THEY DO NOT PASS THROUGH DESIGNATED ELECTRICAL SPACES AS REQUIRED BY THE NATIONAL ELECTRICAL CODE.
5. ALL OPENINGS THROUGH FIRE RATED WALLS SHALL BE FIRESTOPPED IN ACCORDANCE WITH THE SPECIFICATIONS.
6. ALL DUCTWORK UPSTREAM OF TERMINAL UNITS SHALL BE CONSTRUCTED TO SMACNA 4" W.G. PRESSURE CLASSIFICATION. ALL RIGID DUCTWORK DOWNSTREAM OF TERMINAL UNITS SHALL BE CONSTRUCTED TO SMACNA 0.5" W.G. PRESSURE CLASSIFICATION. ALL RIGID DUCTWORK SHALL BE SEALED TO SMACNA SEAL CLASS A REQUIREMENTS.
7. RUN-OUTS DRAWN DOUBLE-LINE SHALL BE RIGID. RUN-OUTS DRAWN SINGLE LINE SHALL BE FLEXIBLE.
8. WHERE SPACE PERMITS, PROVIDE FOUR LINEAR FEET OF FLEXIBLE DUCT AT INLET OF EACH TERMINAL UNIT.
9. EXCEPT FOR RUN-OUTS, WHERE A DUCT SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE DUCT SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED. RIGID AND FLEXIBLE RUN-OUT SIZES NOT SHOWN SHALL BE MINIMUM EQUAL TO THE INLET DIAMETER OF THE DEVICE TO WHICH THE DUCT IS CONNECTED.
10. COORDINATE DUCT ELEVATIONS WITH OTHER DUCTWORK, CABLE TRAY, LIGHTS, BUILDING STRUCTURE AND OTHER TRADES TO INSURE THAT CEILING HEIGHTS SHOWN ON THE INTERIOR FINISH SCHEDULE ARE MAINTAINED. ACCESS TO CABLE TRAY SHALL BE MAINTAINED AND ALL OPERABLE DUCTWORK DEVICES SHALL BE ACCESSIBLE.
11. FLEXIBLE DUCT BENDS SHALL HAVE A CENTERLINE RADIUS OF NOT LESS THAN 1 DUCT DIAMETER. DUCTS SHALL BE SUPPORTED WITH MAXIMUM 1/2" PER FOOT SAG BETWEEN SUPPORTS.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

FIRST FLOOR HVAC PLAN
SCALE: 3/16" = 1'-0"



Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	HVAC PLAN FIRST FLOOR	
Checked by:	JBT	Scale: 3/16" = 1'	Sheet number: M-2 Plot Scale: 16:3
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501M002.3D
		Dwg. No.: AF 141-753-01	File No.:



631-000- 156-117 M-3

AIR HANDLING UNIT SCHEDULE

AIR HANDLING UNIT SCHEDULE														
AHU #	DESCRIPTION	FAN DATA				MOTOR DATA				FILTER FACE AREA SQ. FT.	MIN. OUTSIDE AIR (CFM)	NOTES		
		EXT. TOTAL PRESS.	APP. EXT. S.P. @ OUT VEL. FT./MIN.	CFM	SIZE	TYPE	FAN RPM	MIN. H.P.	VOLT				PHASE	
1	HORIZ DT VAV	2.80	2.80	-	13085	35"	PLUG	1001	15	460	3	52.0	1990	1,2,3
2	HORIZ DT VAV	2.40	2.40	-	12945	35"	PLUG	961	15	460	3	52.0	1750	1,2,3
3	SINGLE ZONE DT	0.85	0.66	1747	4035	13"	FC	1106	3	460	3	13.5	4035	1,3

1. UNIT TOTAL PRESSURE (STATIC + VELOCITY) DOES NOT INCLUDE RESISTANCE FOR UNIT COILS, FILTERS, UNIT CASING AND UNIT DAMPERS. CONTRACTOR SHALL ADD VALUES FROM ACTUAL EQUIPMENT SELECTED TO DETERMINE UNIT TOTAL PRESSURE REQUIREMENTS (USE 0.30" W.G. MIN FOR DIRTY FILTERS). FAN EXTERNAL STATIC PRESSURE MAY BE DETERMINED BY SUBTRACTING SELECTED FAN OUTLET VELOCITY PRESSURE FROM CALCULATED UNIT TOTAL PRESSURE.
2. UNIT SHALL BE PROVIDED WITH VARIABLE FREQUENCY DRIVE. SEE SPECS AND CONTROL DRAWINGS.
3. UNIT SHALL BE MOUNTED ON A 4" HIGH CONCRETE HOUSEKEEPING PAD.

COOLING COIL DATA

AHU #	COIL TYPE	TOTAL CAPACITY BTUH	SENSIBLE CAPACITY BTUH	ROWS (MIN)	E.W.T. °F	L.W.T. °F	E.A.T. °F DB	E.A.T. °F WB	L.A.T. °F DB	L.A.T. °F WB	GPM	MAX. WATER PRESS. DROP (FT. H2O)	MAX. WET AIR PRESS. DROP (IN. H2O)
1	CHILLED WATER	415519	333480	4	43	53	79.1	64.9	55.3	53.9	114.7	30	0.50
2	CHILLED WATER	408624	332578	4	43	53	79.8	65.2	55.7	54.4	112.8	30	0.50
3	CHILLED WATER	175680	130370	4	43	53	87.0	70.0	57.7	56.6	48.5	20	0.50

NOTES:
1. CHILLED WATER COOLING COIL DATA BASED ON 50% GLYCOL SOLUTION.

PACKAGED CHILLER SCHEDULE

C #	MINIMUM CAPACITY BTUH	E.W.T. °F	L.W.T. °F	MIN. NO. OF COMPRESSORS	MIN. CAPACITY STAGES	MAX. WATER PRESS. DROP (FT. H2O)	MIN. ER	MAX. KW	VOLT	PHASE	OUTSIDE AMBIENT TEMP	GPM
1	999930	53.0	43.0	1	10-100% ADJ	30	9.5	110	480	3	95	276.0

NOTES:
1. CAPACITY BASED ON 50% GLYCOL SOLUTION. GLYCOL TO BE PROVIDED BY CONTRACTOR. SEE SPECIFICATIONS.
2. UNIT SHALL BE MOUNTED ON A 12" CONCRETE PAD.
3. UNIT MOTORS SHALL BE RATED FOR 460 V.
4. UNITS SHALL BE PROVIDED WITH OTHER CONTROL OPTIONS. SEE TEMPERATURE CONTROL DRAWINGS AND SPECIFICATIONS.

CABINET UNIT HEATER SCHEDULE

CUH #	CABINET TYPE	NOM. CFM	COIL DATA			MOTOR DATA			
			CAPACITY BTUH	GPM	MAX PRES DROP (FT)	HP	RPM	VOLT	PHASE
1	159 LOCKER	230	8657	0.70	0.10	1/30	1100	115	1
2	121 OXY BOTT	230	10595	0.80	0.10	1/30	1100	115	1

NOTES:
1. CAPACITY AND GPM BASED ON 200° F E.W.T. AND 170° F L.W.T. 50% GLYCOL SOLUTION.
2. CUH-2 AND THERMOSTAT SHALL BE SUITABLE FOR OPERATION IN A CLASS 1, DIVISION 1 ENVIRONMENT AS DEFINED BY NFPA 70.

PROPELLER UNIT HEATER SCHEDULE

PUH #	LOCATION	CFM	COIL DATA		MOTOR DATA				NOTES	
			MINIMUM CAPACITY BTUH	GPM	MAX WPD (F/T)	HP	RPM	VOLT		PHASE
1	137 MECH	815	17383	1.4	0.20	1/20	1550	115	I	---
2	231 MECH	815	18867	1.4	0.20	1/20	1550	115	I	---
3	139 HAZ STOR	815	20590	1.6	0.20	1/20	1550	115	I	I
4	136 OUTSIDE ST	316	4315	0.60	0.20	1/25	1650	115	I	---
5	116 EX/FL STOR	540	10910	0.80	0.20	1/20	1550	115	I	I

1. HEATER AND THERMOSTAT SHALL BE SUITABLE FOR OPERATION IN A CLASS 1, DIVISION 2 ENVIRONMENT AS DEFINED BY NFPA 70.
2. CAPACITY BASED ON 50% GLYCOL SOLUTION.

PUMP SCHEDULE

P #	DESCRIPTION	PUMP DATA				MOTOR DATA				NOTES
		TYPE	SIZE	SERIES	PEAK GPM	HEAD (FT)	MIN HP	VOLT	PHASE	
1	CHILLED WATER	BASE MNTD CENT	4x3x10	--	276.0	75	15	460	3	1,2,4
2,3	HOT WATER	BASE MNTD CENT	3x1.5x8	--	121.4	45	3	460	3	1,2,4
4	DOMESTIC RECIRC	INLINE CIRC	1 1/2	--	20.9	25	1/2	460	3	2
5-8	BOILER CIRC	INLINE CIRC	1 1/2	--	26.8	12	1/2	460	3	1,2,3,4
9	ELEV SUMP PUMP	SUMP PUMP	1 1/2	--	25	10	1/4	115	1	2

NOTES:
1. PUMP SELECTION SHALL BE BASED ON A 50% GLYCOL SOLUTION.
2. PUMPS SHALL NOT EXCEED 1800 RPM.
3. PROVIDE 1 BOILER PUMP PER BOILER. NUMBER OF BOILER MODULES AND PUMP GPM MAY VARY. SEE BOILER SCHEDULE.
4. THE HEATING AND COOLING SYSTEM PUMP REQUIREMENTS ARE BASED ON THE FOLLOWING PIPING PARAMETERS:
- TYPE L COPPER TUBING IS USED FOR PIPES 2" AND SMALLER
- SCHEDULE 40 STEEL PIPE IS USED FOR PIPES 2 1/2" AND LARGER

OTHER MATERIALS OR MATERIAL COMBINATIONS MAY BE USED TO FABRICATE THE PIPING SYSTEMS IN ACCORDANCE WITH THE SPECIFICATIONS, HOWEVER, WHEN MATERIALS ARE USED OTHER THAN AS INDICATED ABOVE, THE CONTRACTOR SHALL SUBMIT A PIPE SYSTEM ANALYSIS WITH CALCULATIONS IN WHICH ALL PIPE SIZES SHALL BE RESIZED OR VERIFIED, AND THE NEW SYSTEM PUMPING HEAD IS DETERMINED. CHANGES IN SYSTEM VOLUME SHALL BE DETERMINED AND EXPANSION TANK SIZES VERIFIED. ANY CHANGES IN PUMP ELECTRICAL CHARACTERISTICS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. PIPING SHALL BE SIZED IN ACCORDANCE WITH THE FOLLOWING LIMITATIONS:

- FOR PIPES 2" AND SMALLER, THE MAXIMUM VELOCITY SHALL BE 4 FEET PER SECOND.
- FOR PIPES 2 1/2" AND LARGER, THE MAXIMUM FRICTION LOSS SHALL BE 4 FEET HEAD PER 100 FOOT OF PIPE LENGTH.

EXHAUST FAN SCHEDULE

EXHAUST FAN SCHEDULE										
EF #	AREA SERVED	FAN DATA				MOTOR DATA			NOTES	
		TYPE	CFM	APPROX FAN RPM	S.P. (IN. H2O)	MAX SONES	MIN H.P.	VOLT		PHASE
1	1ST/2ND FLR MECH	INLINE CENTRIFUGAL	4400	617	0.50	12	3/4	460	3	--
2	136 OUTSIDE STOR	INLINE CENTRIFUGAL	310	1050	0.25	-	1/50	115	1	--
3	139 HAZ STOR	INLINE CENTRIFUGAL	220	1050	0.25	-	1/50	115	1	NOTE 2
4	116 EXD/CEL STOR	INLINE CENTRIFUGAL	95	1550	0.25	-	1/40	115	1	NOTE 2
5	1ST FLR TOILETS	INLINE CENTRIFUGAL	1530	1103	0.70	12	1/3	115	1	--
6	2ND FLR TOIL/RELIEF	INLINE CENTRIFUGAL	3100	1034	0.75	14	3/4	460	3	--
7	COMM RMS	INLINE CENTRIFUGAL	1035	1360	0.70	12	1/4	115	1	--
8	123 ELEV EQUIP	INLINE CENTRIFUGAL	930	1180	0.50	12	1/4	115	1	--
9	121 OXY BOTTLE	INLINE CENTRIFUGAL	420	1300	0.25	8	1/15	115	1	NOTE 1

1. FAN SHALL BE SUITABLE FOR OPERATION IN A CLASS 1, DIVISION 1 ENVIRONMENT AS DEFINED BY NFPA 70.
2. FAN SHALL BE SUITABLE FOR OPERATION IN A CLASS 1, DIVISION 2 ENVIRONMENT AS DEFINED BY NFPA 70.

HOT WATER HEATING COIL DATA

AHU #	SERVICE	MINIMUM CAPACITY BTUH	CFM	MIN NO. COILS	MIN ROWS	MAX. PRESS. DROP (FT)	MAX. AIR PRESS. (H2O)	GPM	E.W.T. °F	L.W.T. °F	E.A.T. °F	L.A.T. °F
1	PREHEAT	163671	1990	1	1	3	0.17	12.6	200	170	-22	55
2	PREHEAT	142631	1750	1	1	3	0.17	11.0	200	170	-22	56
3	HEATING	401911	4035	1	2	5	0.25	31.0	200	170	-22	70
3	REHEAT	54730	4035	1	1	3	0.20	10.9	120	110	57.7	70

1. HOT WATER HEATING COIL DATA BASED ON 50% GLYCOL SOLUTION (EXCEPT AHU-3 REHEAT).

MODULAR BOILER SCHEDULE

<div><div>B</div><div>#</div></div>	LOCATION	BOILER				ELECTRICAL DATA			
		NET OUTPUT EA (BTU/HR)	MIN. COMB. EFFICIENCY	GAS INPUT (CFH)	WATER TEMP. OUT, °F	BURNER TYPE	AMPS	VOLT	PHASE
1 - 4	137 MECH	334000	90	392	200	PULSE COMB	5	115	1

1. BURNERS SHALL DRAW COMBUSTION AIR AND DISCHARGE PRODUCTS OF COMBUSTION THROUGH THE WALL.
2. MIN BOILER EFFICIENCY RATING BASED ON 120° F RETURN WATER TEMPERATURE FROM SYSTEM.
3. ACTUAL NUMBER OF MODULES PROVIDED MAY VARY. ALL MODULES SHALL BE OF THE SAME SIZE. A MINIMUM OF 3 MODULES SHALL BE PROVIDED. A GREATER NUMBER OF SMALLER BOILER MODULES MAY ALSO BE PROVIDED. IN EITHER CASE, SYSTEM TOTAL CAPACITY SHALL BE MET. CONTRACTOR SHALL BE RESPONSIBLE FOR EQUIPMENT LAYOUT AND ADJUSTMENTS TO MECHANICAL AND ELECTRICAL SYSTEMS AND OTHER TRADES IF NUMBER OF MODULES PROVIDED VARIES FROM THAT SHOWN. EQUIPMENT SELECTION, SIZING AND LAYOUT SHALL BE APPROVED PRIOR TO INSTALLATION.
4. CAPACITY SHALL BE BASED ON 50% GLYCOL SOLUTION. GLYCOL SHALL BE PROVIDED BY CONTRACTOR. SEE SPECS.

EXPANSION/COMP. TANK SCHEDULE

ET #	CAPACITY (GALLONS)	MIN. ACCEPTANCE VOLUME (GALLONS)	APPROX. SIZE (INCHES)	REMARKS
1	5.2	2.4	19"x12"	CHILLED WATER SYSTEM
2	60	20	44"x24"	HOT WATER SYSTEM

SIZE OF TANK AND ACCEPTANCE VOLUME IS MINIMUM REQUIRED. THESE MAY VARY WITH EACH MANUFACTURER.

HOT WATER HEATER SCHEDULE

WH #	LOCATION	INPUT RATING BTUH	RECOVERY GPH AT 60° F RISE	STORAGE CAPACITY GALLONS	GAS INPUT CFH	ELECTRICAL HP	VOLT	PHASE
1	137 MECH	199000	378	100	199	1/3	115	1

NOTES:
1. DELIVERY TEMPERATURE FOR DOMESTIC HOT WATER SHALL BE 120 DEGREES F.
2. MINIMUM HEATER EFFICIENCY SHALL BE 94%. UNIT SHALL BE SEALED COMBUSTION, SIDEWALL VENTED.

FINNED TUBE RADIATOR SCHEDULE

FT #	MINIMUM CAPACITY BTUH	ELEMENT LENGTH IN.	GPM	TUBE DIA.	EWT °F	EAT °F	FINS PER FOOT	TIER AND CL DIST	ENCLOSURE LENGTH
1	5246	70	1.2	3/4"	200	70	40	1	7'-2"
2	6307	80	1.2	3/4"	200	70	40	1	8'-0"
3	6077	77	1.2	3/4"	200	70	40	1	7'-0"
4	5720	75	1.2	3/4"	200	70	40	1	9'-0"

NOTES:
1. DESIGN BASED ON COPPER TUBES WITH 3/4" SQUARE x 0.020" ALUMINUM FINS.
2. COORDINATE FINNED TUBE ENCLOSURE WITH WALL RECEPTACLES AND OTHER BUILDING COMPONENTS PRIOR TO INSTALLATION. ADJUST EQUIPMENT LOCATION AS NECESSARY.
3. HEATING CAPACITIES SHALL BE BASED ON A 50% GLYCOL SOLUTION.

RADIATION CONVECTOR SCHEDULE

ITEM	MINIMUM CAPACITY BTUH	GPM	EWT °F	EAT °F	ENCLOSURE LENGTH
CONV-1	6495	1.2	200	70	4'-8"

NOTES:
1. COORDINATE CONVECTOR ENCLOSURE WITH WALL RECEPTACLES AND OTHER BUILDING COMPONENTS PRIOR TO INSTALLATION. ADJUST EQUIPMENT LOCATION AS NECESSARY.
3. HEATING CAPACITIES SHALL BE BASED ON A 50% GLYCOL SOLUTION.

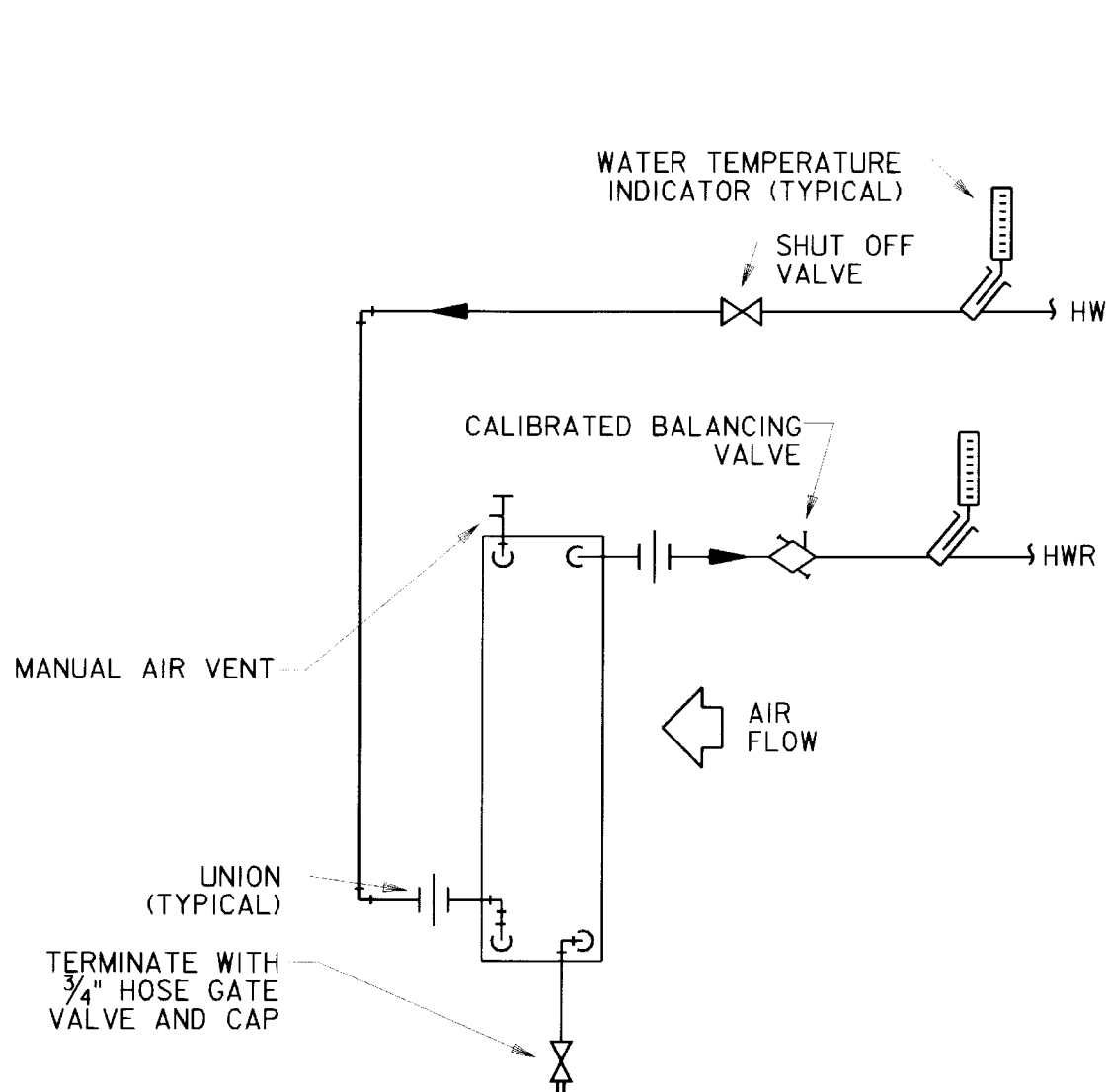
VAV TERMINAL BOX SCHEDULE

VAV TERMINAL BOX SCHEDULE																
VAV #	PRIMARY AIR OPERATING DATA			FAN DATA			FAN ELECTRICAL		HEATING COIL DATA							
	MAX CFM	MIN CFM	DNSTRM DUCT STAT PRESS.	CFM	DUCT S.P.	HP	VOLTS	PHASE	BTU/HR.	AIR FLOW CFM	GPM	INLET WATER TEMP. °F	EAT °F	APPROX WTD °F	MAX WPD (FT. H2O)	
1	330	83	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
2	575	144	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
3	565	141	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
4	800	200	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
5	415	104	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
6	870	218	0.25	900	0.38	1/3	115	1ø	69379	900	5.3	200	66	30	8.4	
7	1415	354	0.25	1300	0.33	¾	460	3ø	101434	1300	7.8	200	66	30	8.4	
8	875	219	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
9	550	138	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
10	705	176	0.25	550	0.25	1/3	115	1ø	44712	550	3.5	200	66	30	1.2	
11	935	239	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
12	485	121	0.25	---	---	---	---	---	6381	121	0.5	200	57	30	0.6	
13	750	188	0.25	---	---	---	---	---	4043	188	0.5	200	57	30	0.1	
14	865	216	0.25	---	---	---	---	---	5182	216	0.5	200	57	30	0.1	
15	585	146	0.25	---	---	---	---	---	3506	146	0.5	200	57	30	0.6	
16	460	115	0.25	---	---	---	---	---	5046	154	0.5	200	57	30	0.6	
17	500	125	0.25	---	---	---	---	---	5295	125	0.5	200	57	30	0.6	
18	985	246	0.25	---	---	---	---	---	6156	246	0.5	200	57	30	0.1	
19	545	136	0.25	---	---	---	---	---	3119	136	0.5	200	57	30	0.6	
20	300	75	0.25	---	---	---	---	---	2602	75	0.5	200	57	30	0.5	
21	300	75	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
22	200	50	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
23	580	145	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
24	1600	400	0.25	---	---	---	---	---	6412	400	0.5	200	57.6	30	0.1	
25	535	134	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
26	560	140	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
27	235	59	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
28	1000	250	0.26	---	---	---	---	---	---	---	---	---	---	---	---	
29	1015	254	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
30	855	214	0.25	---	---	---	---	---	---	---	---	---	---	---	---	
31	1230	308	0.25	---	---	---	---	---	10873	308	0.8	200	57.6	30	0.2	
32	840	210	0.25	---	---	---	---	---	6959	210	0.5	200	57.6	30	0.2	
33	920	230	0.25	---	---	---	---	---	8389	230	0.6	200	57.6	30	0.2	
34	565	141	0.25	---	---	---	---	---	4245	141	0.5	200	57.6	30	0.5	
35	1140	285	0.25	---	---	---	---	---	9540	285	0.7	200	57.6	30	0.2	
36	785	196	0.25	---	---	---	---	---	10790	196	0.8	200	57.6	30	0.3	
37	805	201	0.25	---	---	---	---	---	10789	201	0.8	200	57.6	30	0.3	
38	520	130	0.25	---	---	---	---	---	3874	130	0.5	200	57.6	30	0.5	

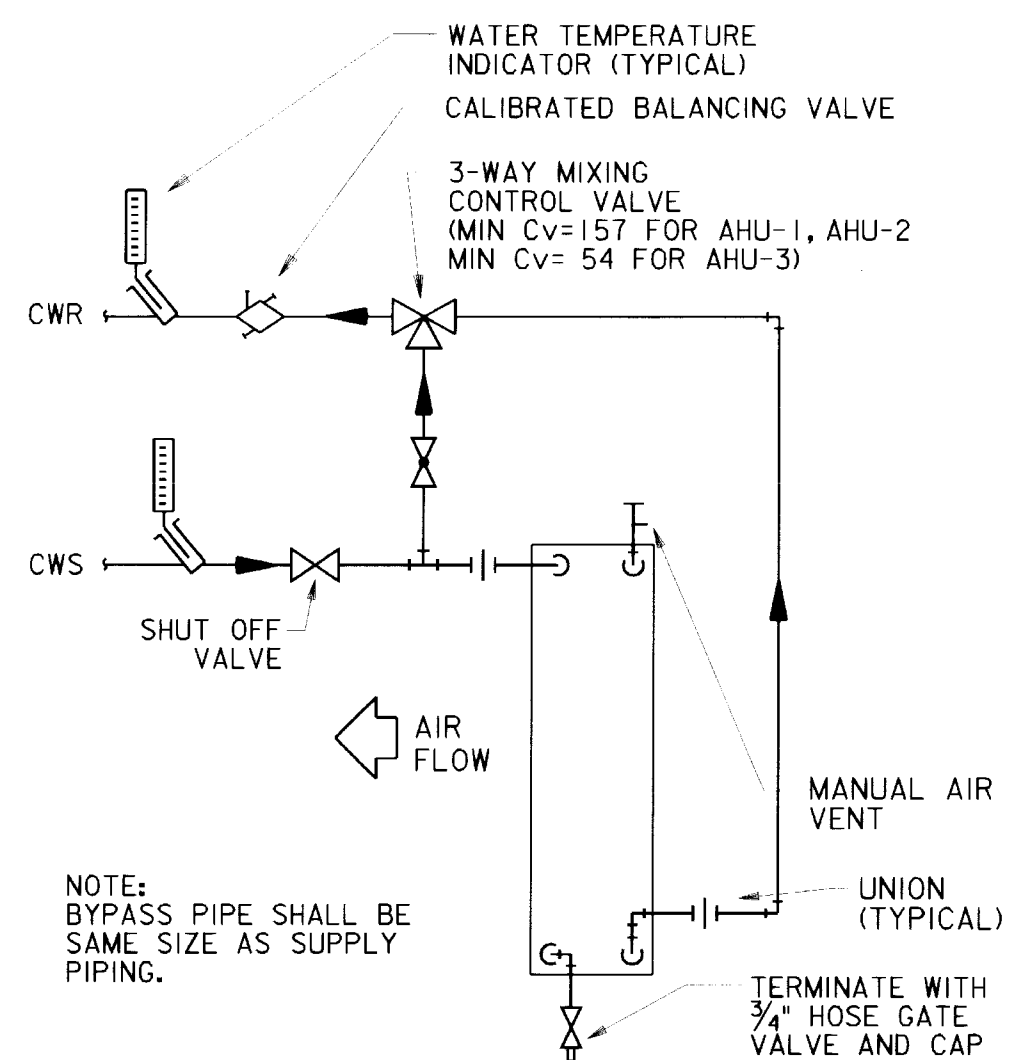
RADIANT CEILING PANEL SCHEDULE

RCP	LOCATION	MINIMUM CAPACITY BTUH	PANEL WIDTH/ NO. TUBES	GPM	EWT °F	NUMBER OF PASSES	PRESS. DROP FT
1	147 MAINT SCHO	7861	16" x 4	0.9	200	1	2.3
2	140 MAINT SUPER	4305	30" x 5	0.5	200	1	0.4
3	149 ELEMENT A	7897	30" x 5	0.9	200	1	2.0
4	154 MT INFO CTRL	10192	24" x 4	1.2	200	1	3.2
5	158 FITNESS	5715	24" x 4	0.7	200	1	0.8
6	103 SCHEDULING	7942	24" x 4	0.9	200	1	1.9
7	104 MT TNG ULLC	3691	24" x 4	0.5	200	1	0.3
8	107 LS LSO/NOIC	7171	18" x 4	0.8	200	1	1.5
9	110 DECON	9427	24" x 4	1.1	200	1	2.6
10	117 HELM/OXY MT	16533	36" x 6	1.9	200	2	2.9
11	127 COMP STOR	3698	24" x 4	0.5	200	1	0.3
12	129 BRFAK	6229	30" x 5	0.7	200	1	1.0
13	145 PRO SUPER	5845	24" x 4	0.7	200	1	0.8
14	163 VESTIBULE	3811	24" x 4	0.5	200	1	0.3
15	146 MAINT	4727	24" x 4	0.5	200	1	0.4
16	237 COMMANDER	6785	16" x 4	0.8	200	1	2.0
17	238 CONFERENCE	4325	16" x 4	0.5	200	1	0.5
18	243 CENTRAL ADMIN	10838	24" x 4	1.3	200	2	0.6
19	201 PROJECTION	2051	24" x 4	0.5	200	1	0.3
20	202 BRIEFING	19169	24" x 4	2.2	200	2	2.9
21	207 TESTING E.	7455	12" x 2	0.9	200	1	1.0
22	207 TESTING S.	3647	12" x 2	0.5	200	1	0.3
23	208 MAN CONTROL	3337	16" x 4	0.5	200	1	0.6
24	210 FLIGHT COMM	9360	16" x 4	1.1	200	2	0.8
25	211 FLT COMM	4705	12" x 2	0.5	200	1	0.4
26	212 FLT COMM	3874	18" x 3	0.5	200	1	0.3
27	213 FLT COMM	3764	18" x 4	0.5	200	1	0.4
28	214 TRNR CARG	4102	24" x 4	0.5	200	1	0.4
29	222 OPS TNG	8047	30" x 5	0.9	200	1	1.8
30	223 TACTICS	5550	24" x 4	0.6	200	1	0.7
31	224 DATA MGMT	5575	24" x 4	0.6	200	1	0.7
32	230 ACE	7990	24" x 4	0.9	200	1	2.1
33	232 ORDERLY RM	8156	16" x 4	0.9	200	1	3.1
34	235 1ST SGNT	2820	16" x 4	0.5	200	1	0.4
35	234 OPS OFF	3235	24" x 4	0.5	200	1	0.3
36	236 XO	3414	16" x 4	0.5	200	1	0.4

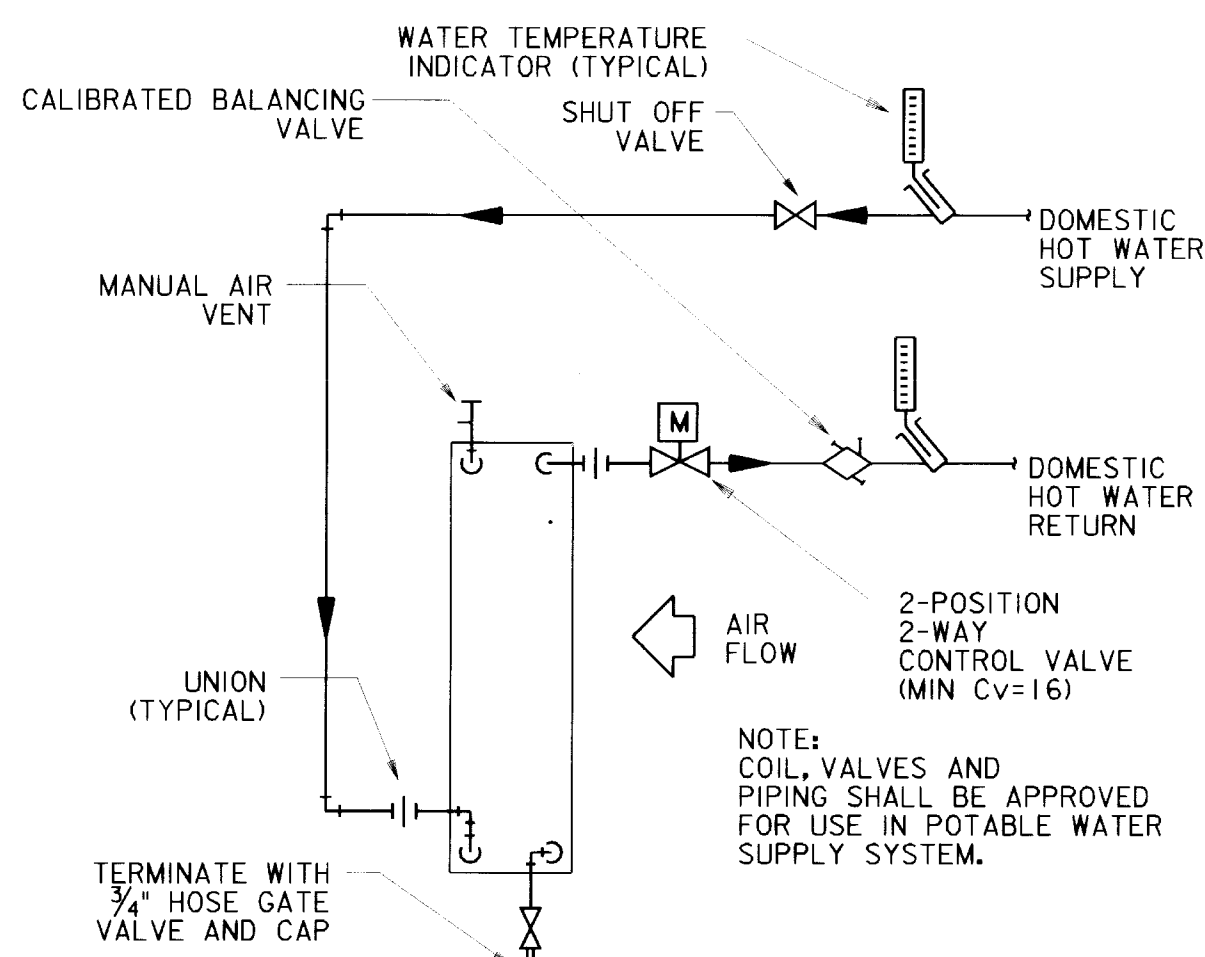
- NOTES:
- DESIGN BASED ON ENGINEERED AIR AIRTEX SYSTEM, WITH EXTRUDED ALUMINUM PANELS & 1/2" ID SOFT COPPER TUBES.
 - PANEL WIDTHS SHALL BE AS SHOWN ON PLANS AND SHALL NOT VARY. CONTRACTOR MAY VARY NUMBER OF TUBES AND CIRCUITING ARRANGEMENTS TO ADJUST PANEL OUTPUT TO MATCH LOAD SHOWN. GPM SHOWN SHALL NOT BE VARIED AND PRESSURE DROP SHOWN SHALL NOT BE EXCEEDED.
 - REFER TO PLANS FOR ADDITIONAL PANEL SECTIONS WHICH ARE INACTIVE AND USED FOR ARCHITECTURAL PURPOSES ONLY.
 - WIDTHS LISTED ABOVE INDICATE THE NOMINAL SIZE PANEL USED. PANELS REQUIRE SIGNIFICANT TRIMMING AND ADDITIONAL FILLER STRIPS FOR CUSTOM FIT TO WALL.
 - CAPACITY BASED ON 50% GLYCOL SOLUTION.



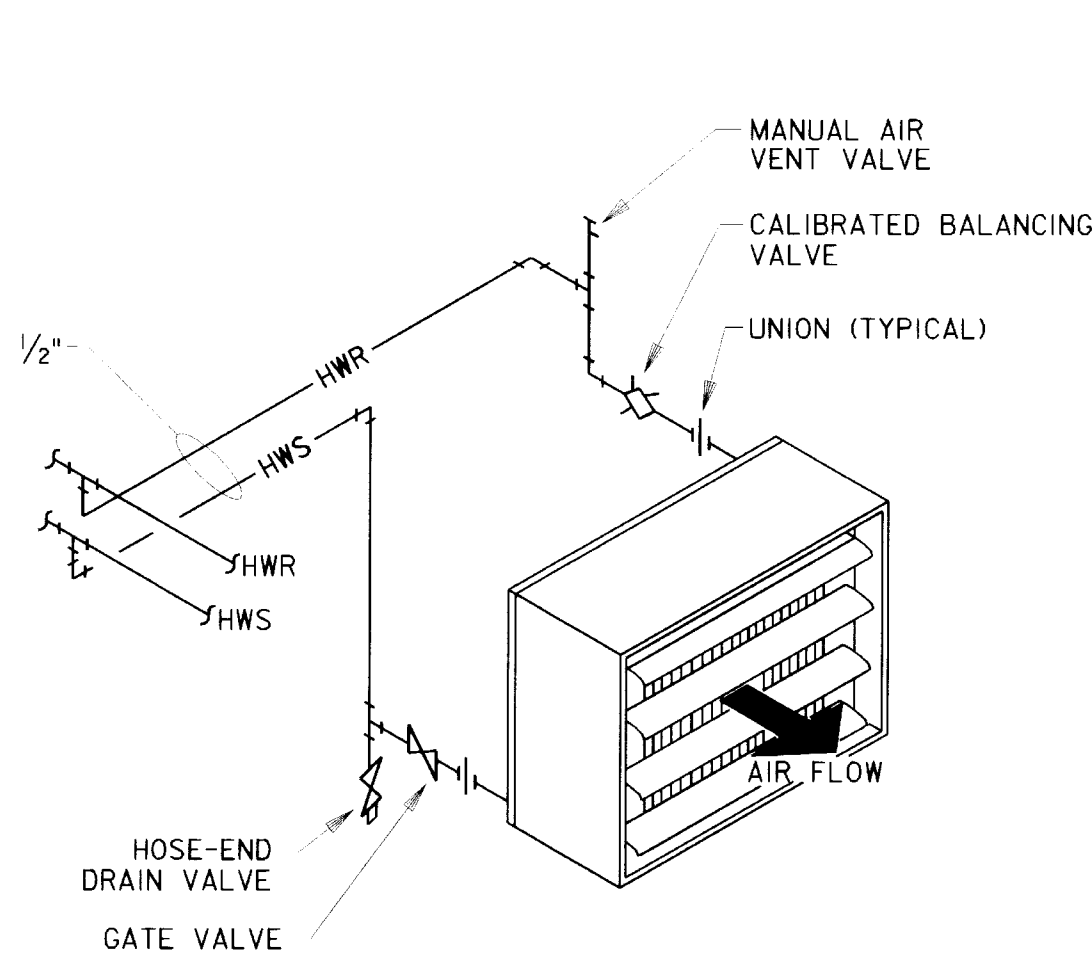
B TYPICAL PREHEAT/AHU-3 HEATING COIL PIPING SCHEMATIC
M5 M5
M6 NOT TO SCALE



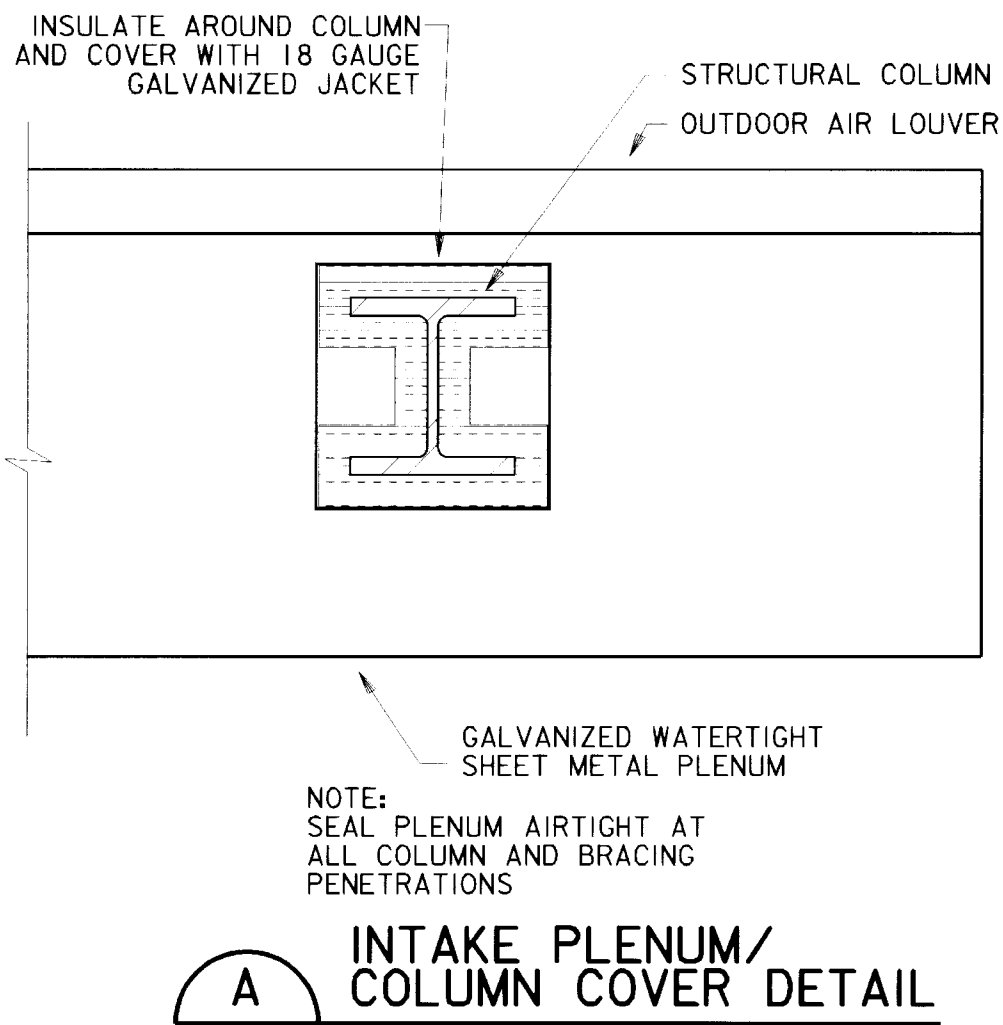
C TYPICAL CHILLED WATER COIL
M5 M5
M6 NOT TO SCALE



D AHU-3 REHEAT COIL DETAIL
M6 M5
NOT TO SCALE



E TYPICAL HORIZ. PROPELLER UNIT HEATER DETAIL
M1 M5
M2 M5
M6 NOT TO SCALE

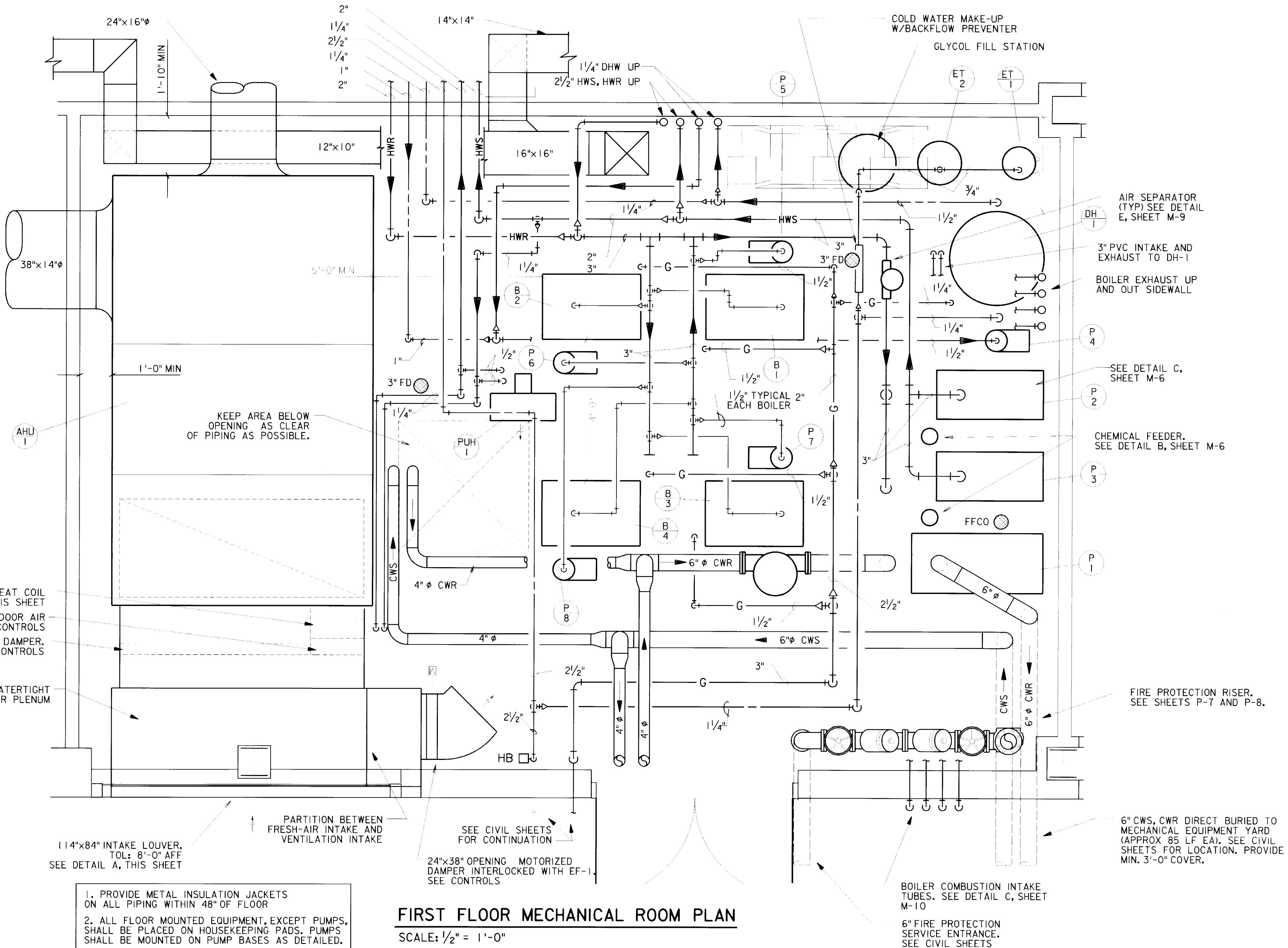


A INTAKE PLENUM/COLUMN COVER DETAIL
M5 M5
M6 NOT TO SCALE

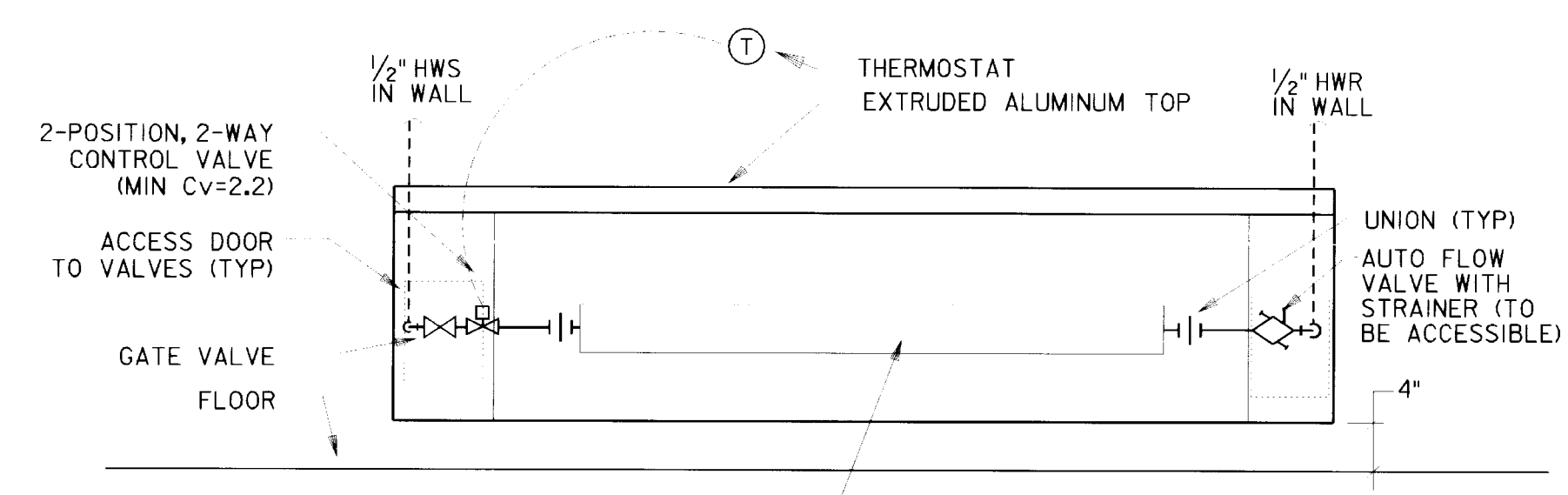
AUTO FLOW VALVE WITH STRAINER NOTE:

- COMBINATION FLOW CONTROL/SHUTOFF VALVES ARE SHOWN LOCATED ON THE RETURN-SIDE OF COILS. SOME MANUFACTURERS REQUIRE THE VALVE TO BE LOCATED ON THE SUPPLY-SIDE OF COIL. EITHER SCHEME MAY BE USED. ACTUAL VALVE LOCATION SHALL BE COORDINATED BY THE CONTRACTOR IN ACCORDANCE WITH THE VALVE MANUFACTURER'S INSTRUCTIONS. SHOP DRAWINGS SHALL REFLECT THE CORRECTED LOCATION OF THE VALVE. IF THE VALVES ARE LOCATED ON THE SUPPLY-SIDE, THE GATE VALVE SHALL BE RELOCATED TO THE RETURN SIDE. COIL STRAINERS, WHERE SHOWN, MAY BE OMITTED IF THE COMBINATION VALVE IS LOCATED ON THE SUPPLY-SIDE.

- PROVIDE METAL INSULATION JACKETS ON ALL PIPING WITHIN 48" OF FLOOR
- ALL FLOOR MOUNTED EQUIPMENT, EXCEPT PUMPS, SHALL BE PLACED ON HOUSEKEEPING PADS. PUMPS SHALL BE MOUNTED ON PUMP BASES AS DETAILED.

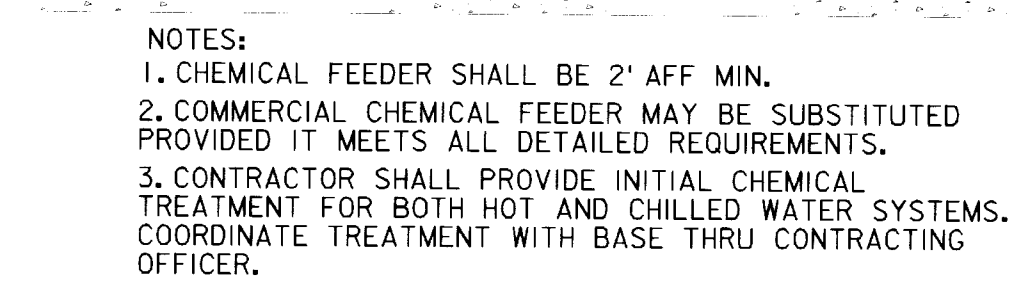


FIRST FLOOR MECHANICAL ROOM PLAN
SCALE: 1/2" = 1'-0"

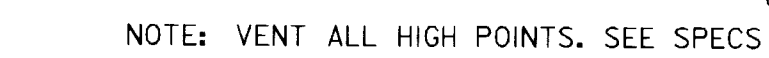
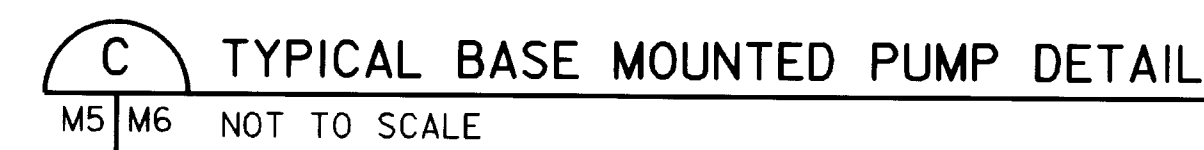



F TYPICAL FINNED TUBE DETAIL
M5 M5
NOT TO SCALE

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	JBT	Grand Forks AFB NORTH DAKOTA	
Drawn by:	JBT	PROJECT NO. JFSD963501 FY97	
Checked by:	JBT	SQUADRON OPERATIONS/AMU	
Submitted by:	PEG		
<p>FIRST FLOOR MECHANICAL ROOM PLAN AND MECHANICAL DETAILS</p>		Scale: AS SHOWN	Sheet number: M-5
<p>Date: FEBRUARY 1997</p>		Plot Scale: 2x1	Design File: C501M005.3D
<p>Dwg. No.: AF 141-753-01</p>		File No.:	



B TYPICAL CHEMICAL FEEDER DETAIL
M5 | M6 NOT TO SCALE






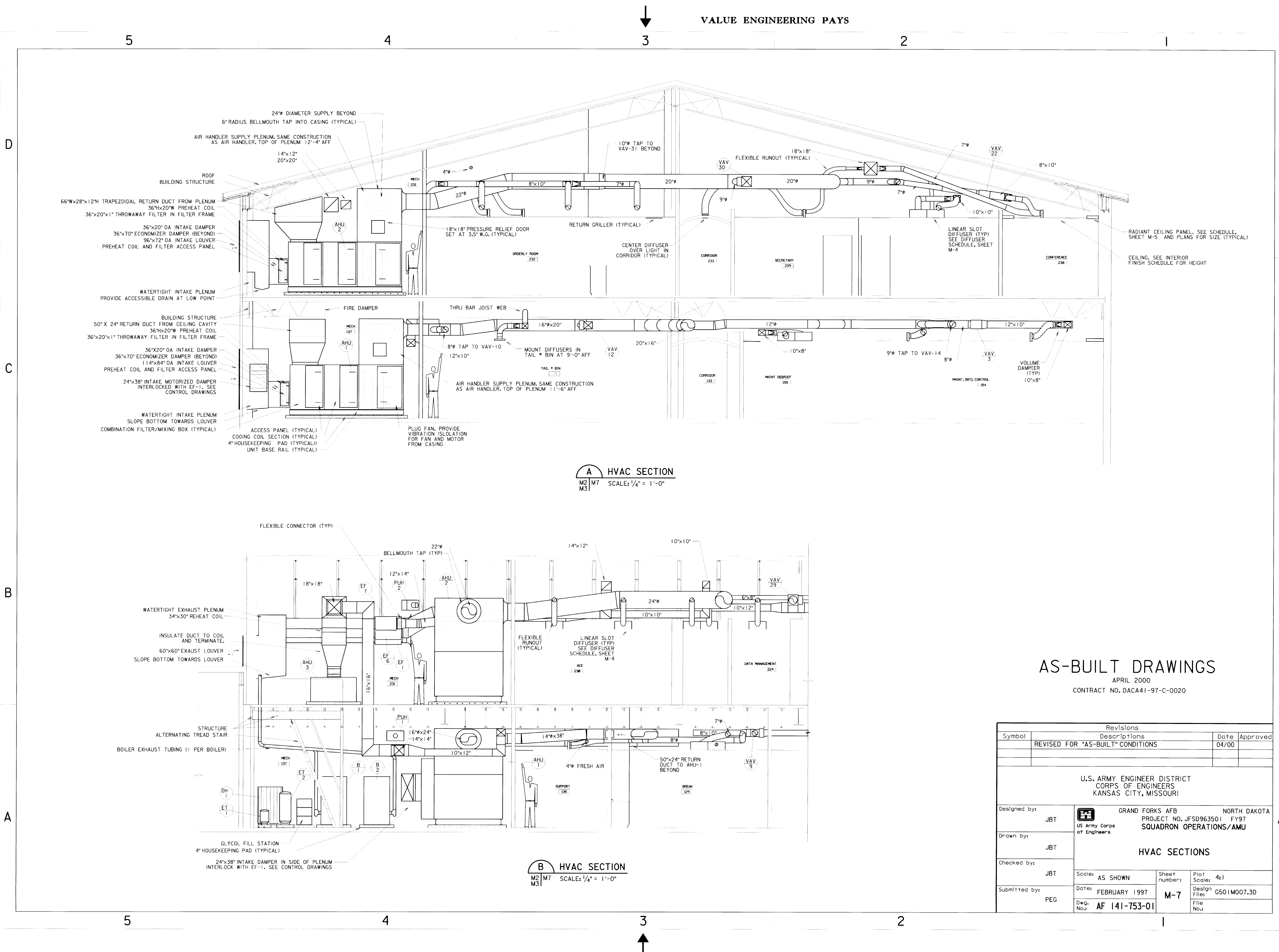


NOTES:
1. PROVIDE METAL INSULATION JACKETS
ON ALL PIPING WITHIN 48" OF FLOOR
2. ALL FLOOR-MOUNTED EQUIPMENT SHALL
BE PLACED ON HOUSEKEEPING PADS.

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

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Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:		<p align="center">SECOND FLOOR MECHANICAL ROOM PLAN AND MECHANICAL DETAILS</p>	
Checked by:			
Submitted by:	Scale:	Sheet number:	Plot Scale:
PEG	AS SHOWN	<p align="center">M-6</p>	2:1
	Date: FEBRUARY 1997		Design File: G501M006.3D
	Dwg. No: AF 141-753-01		File No:



AS-BUILT DRAWINGS

APRIL 2000
 CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	JBT	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	HVAC SECTIONS	
Checked by:	JBT	Scale: AS SHOWN	Sheet number: M-7
Submitted by:	PEG	Date: FEBRUARY 1997	Plot Scale: 4:1
		Dwg. No.: AF 141-753-01	Design File: C501M007.3D
			File No.:

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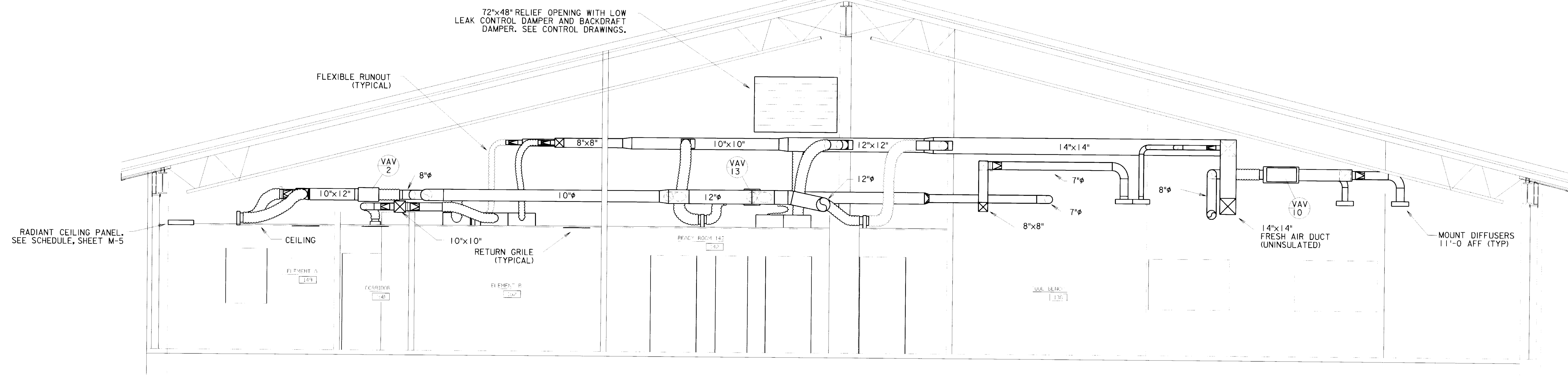
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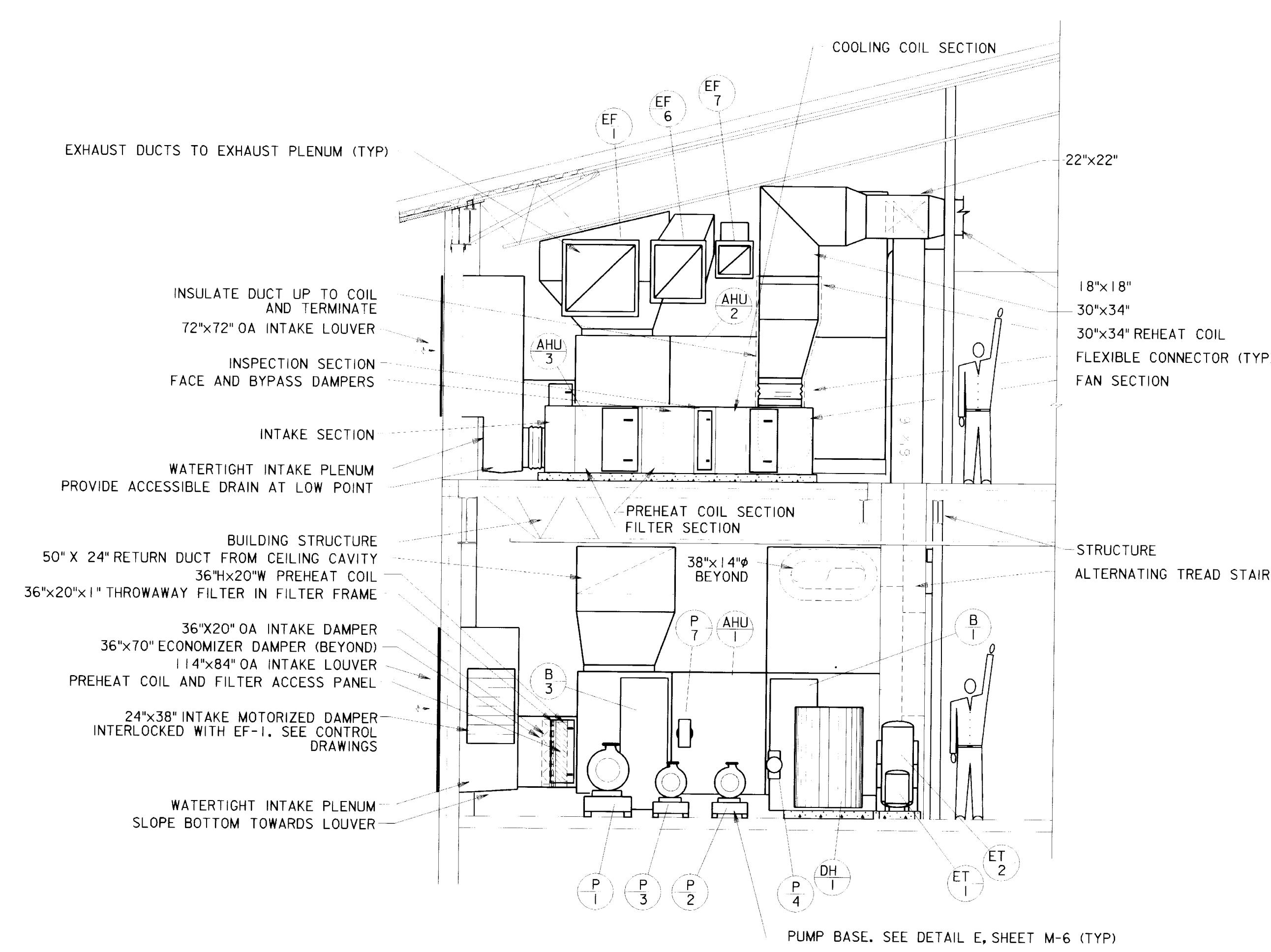
C

B

A



A HVAC SECTION
M2 | M8
M3 | SCALE: 1/4" = 1'-0"



B HVAC SECTION
M2 | M8
M3 | SCALE: 1/4" = 1'-0"

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	HVAC SECTIONS	
Checked by:	JBT	Scale: AS SHOWN	Sheet number: Plot Scale: 4:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501M008.3D
		Dwg. No.: AF 141-753-01	File No.:

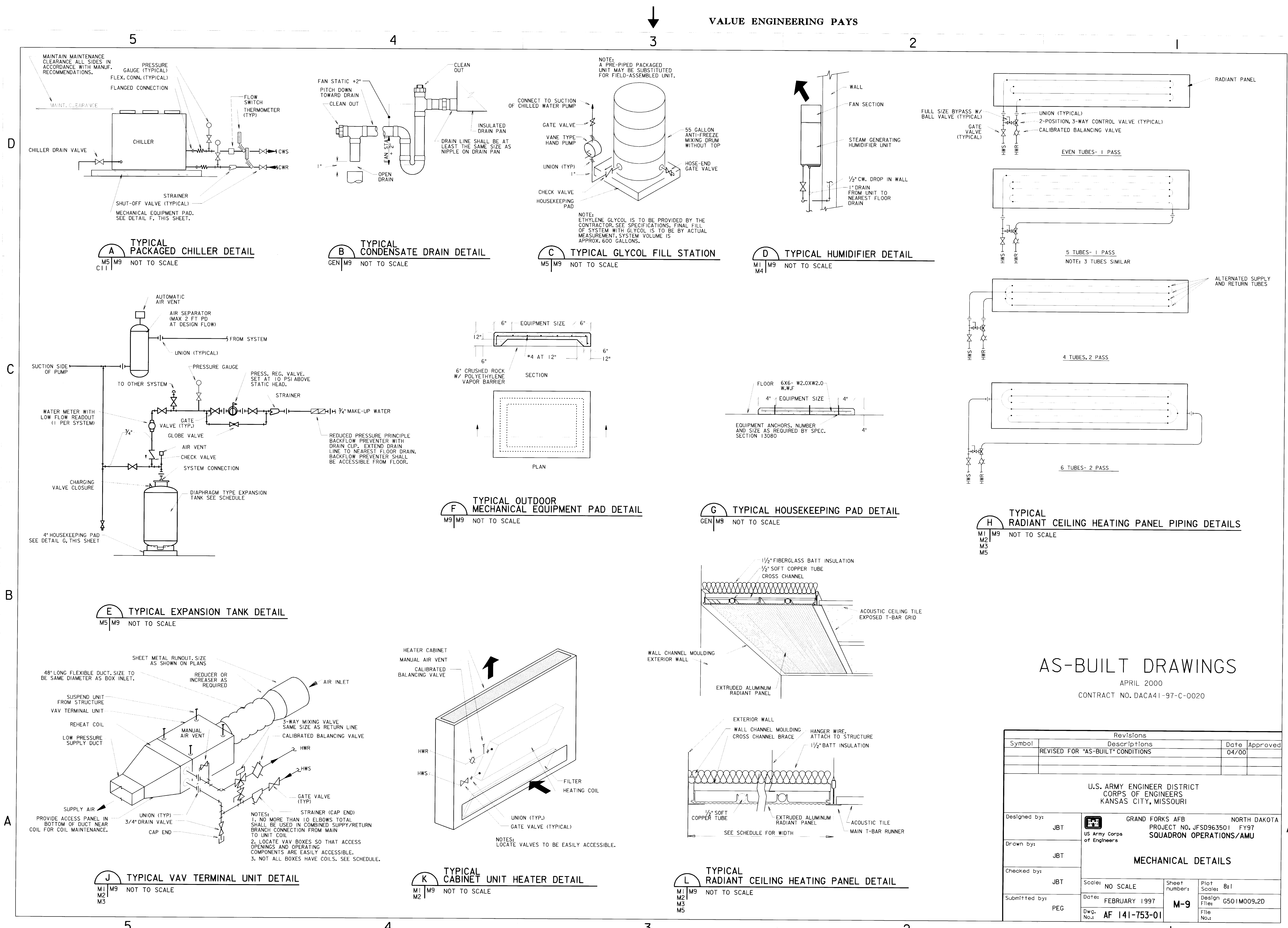
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C

B

A

631-000-156-122 M-8

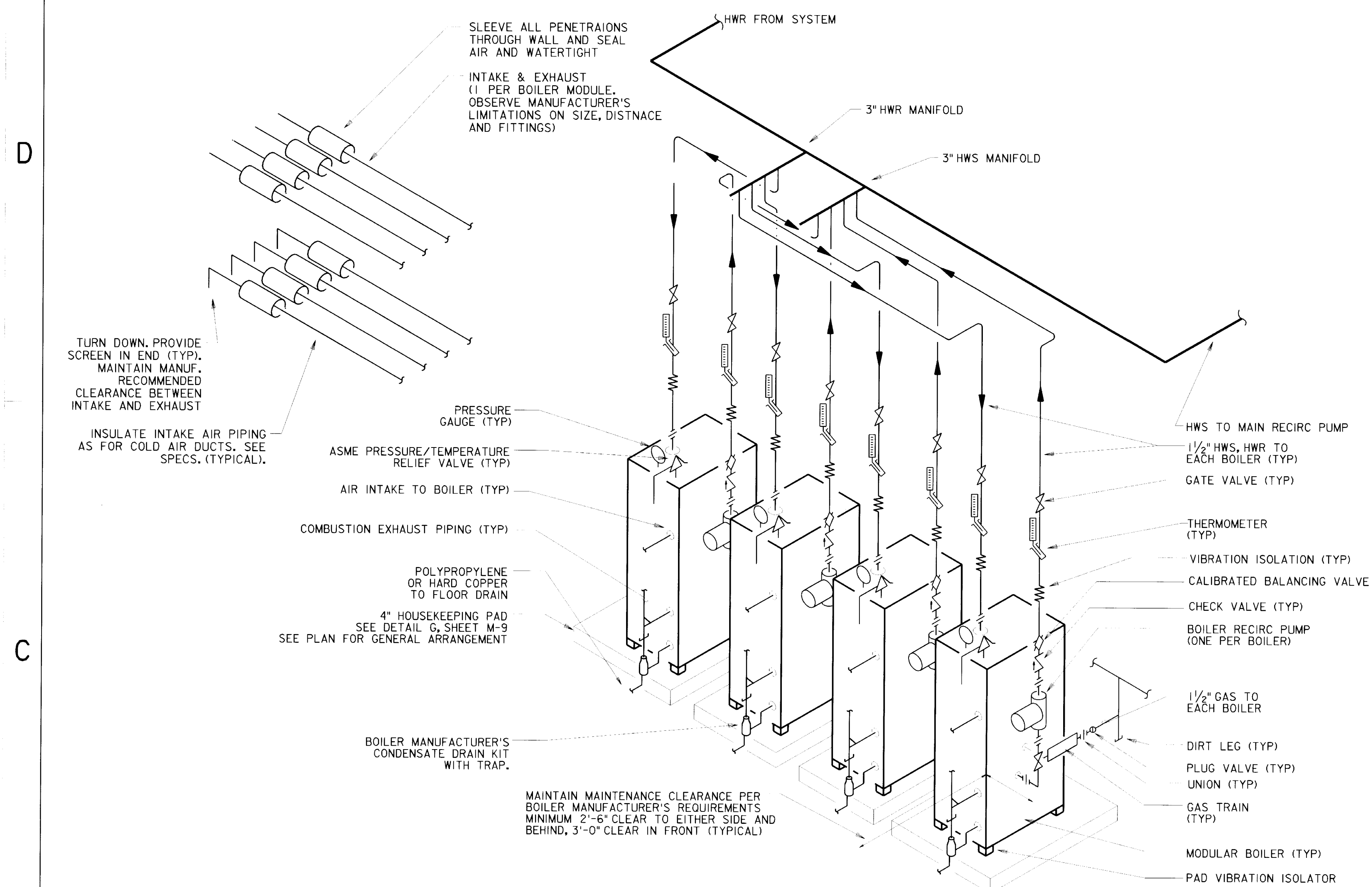


AS-BUILT DRAWINGS

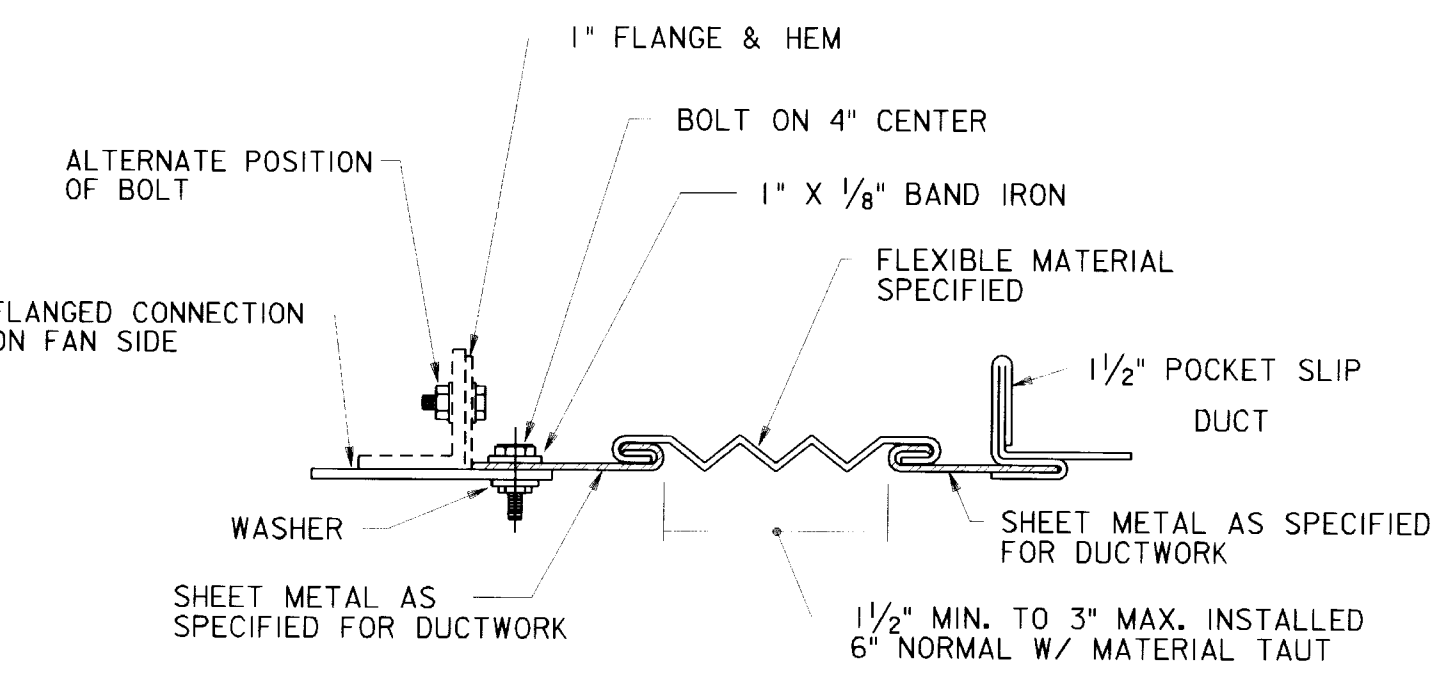
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CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	JBT	MECHANICAL DETAILS	
Checked by:	JBT	Scale: NO SCALE	Sheet number: Plot Scale: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: 6501M009.2D
		Dwg. No.: AF 141-753-01	File No.:

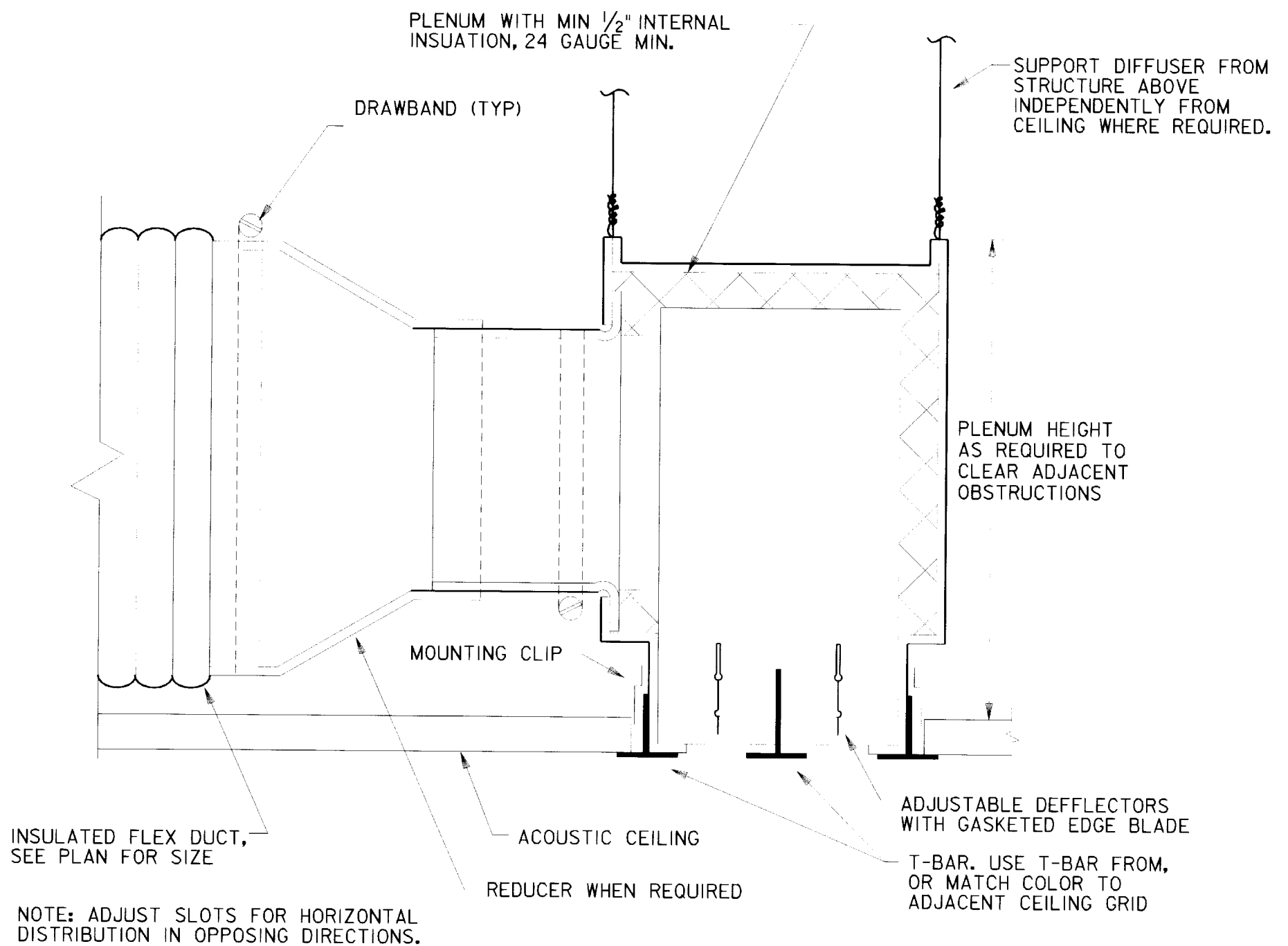
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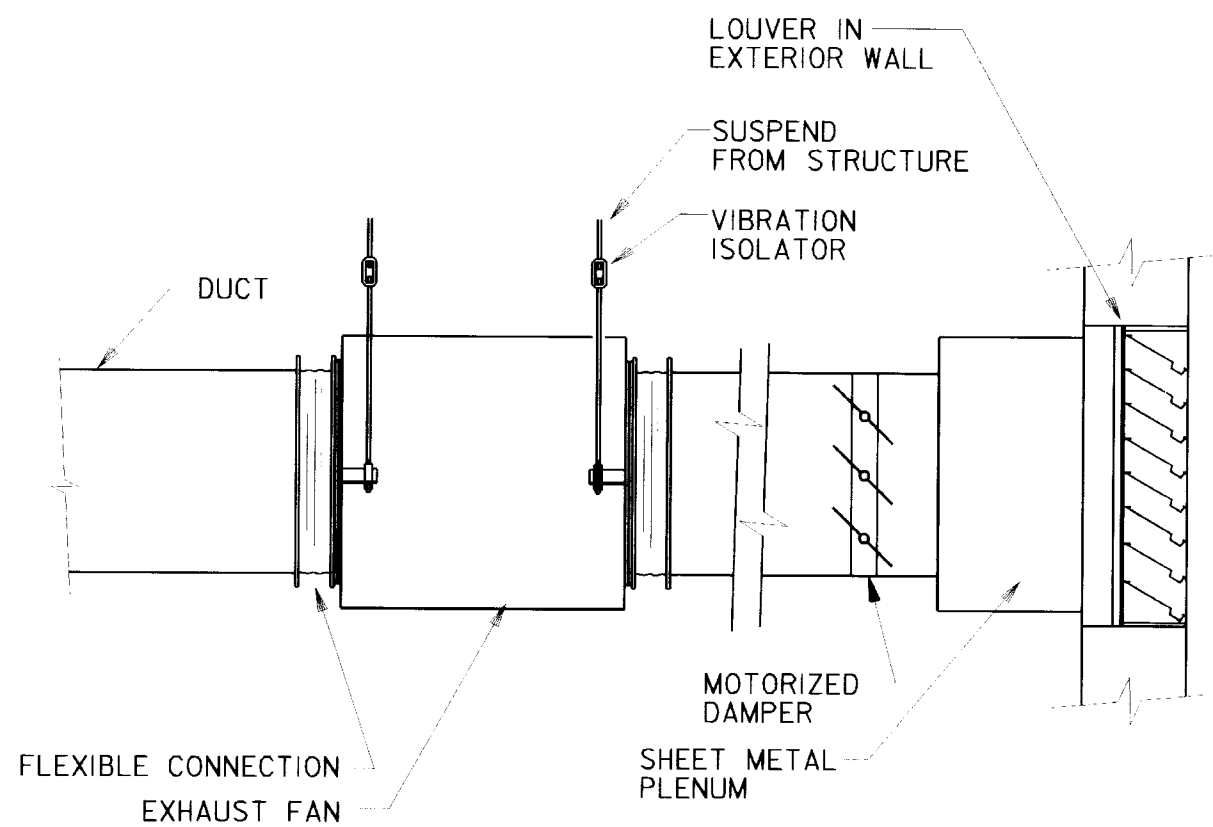
C TYPICAL MODULAR CONDENSING BOILER DETAIL
M5 M10 NOT TO SCALE



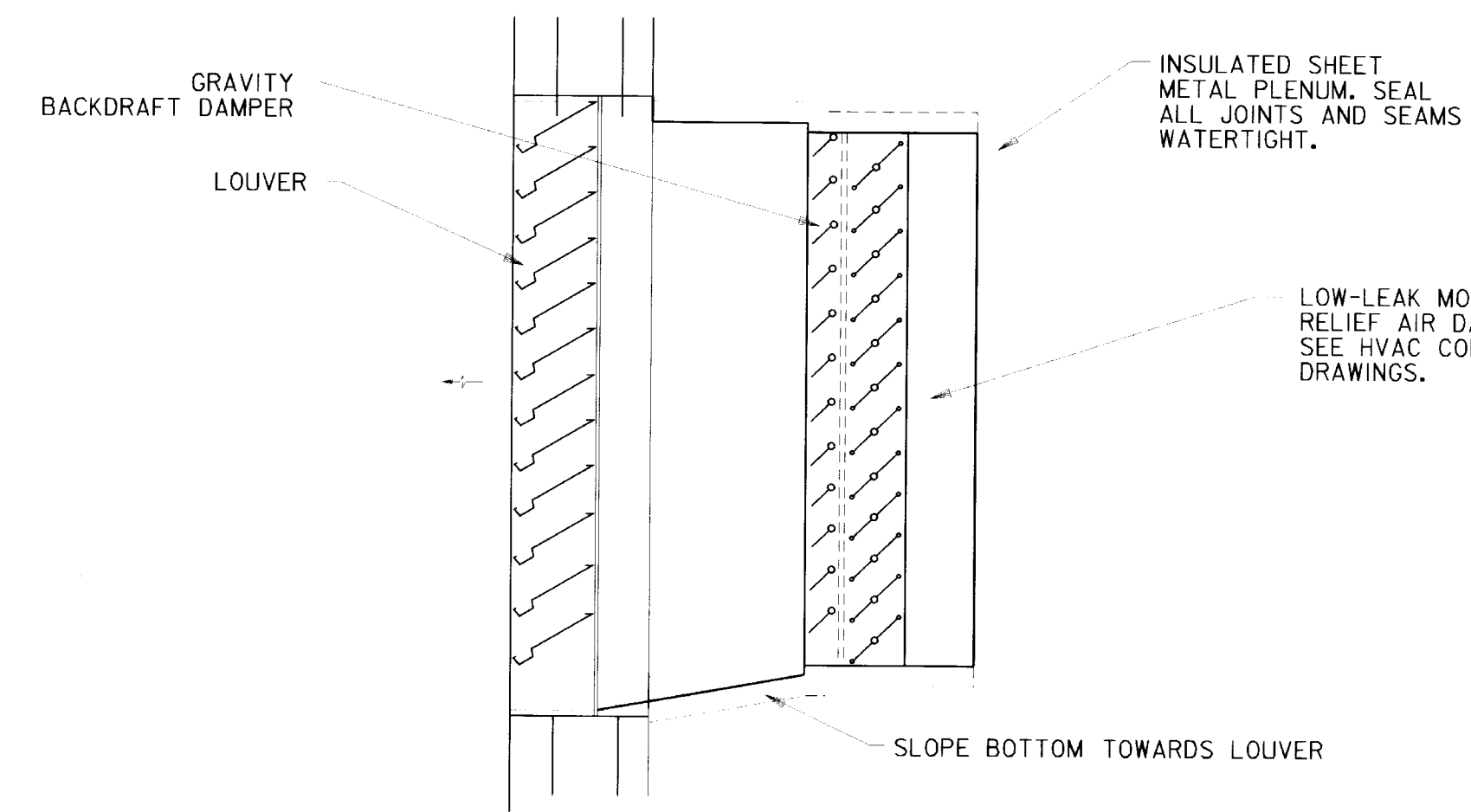
A TYPICAL DUCT FLEXIBLE CONNECTOR DETAIL
GEN M10 NOT TO SCALE



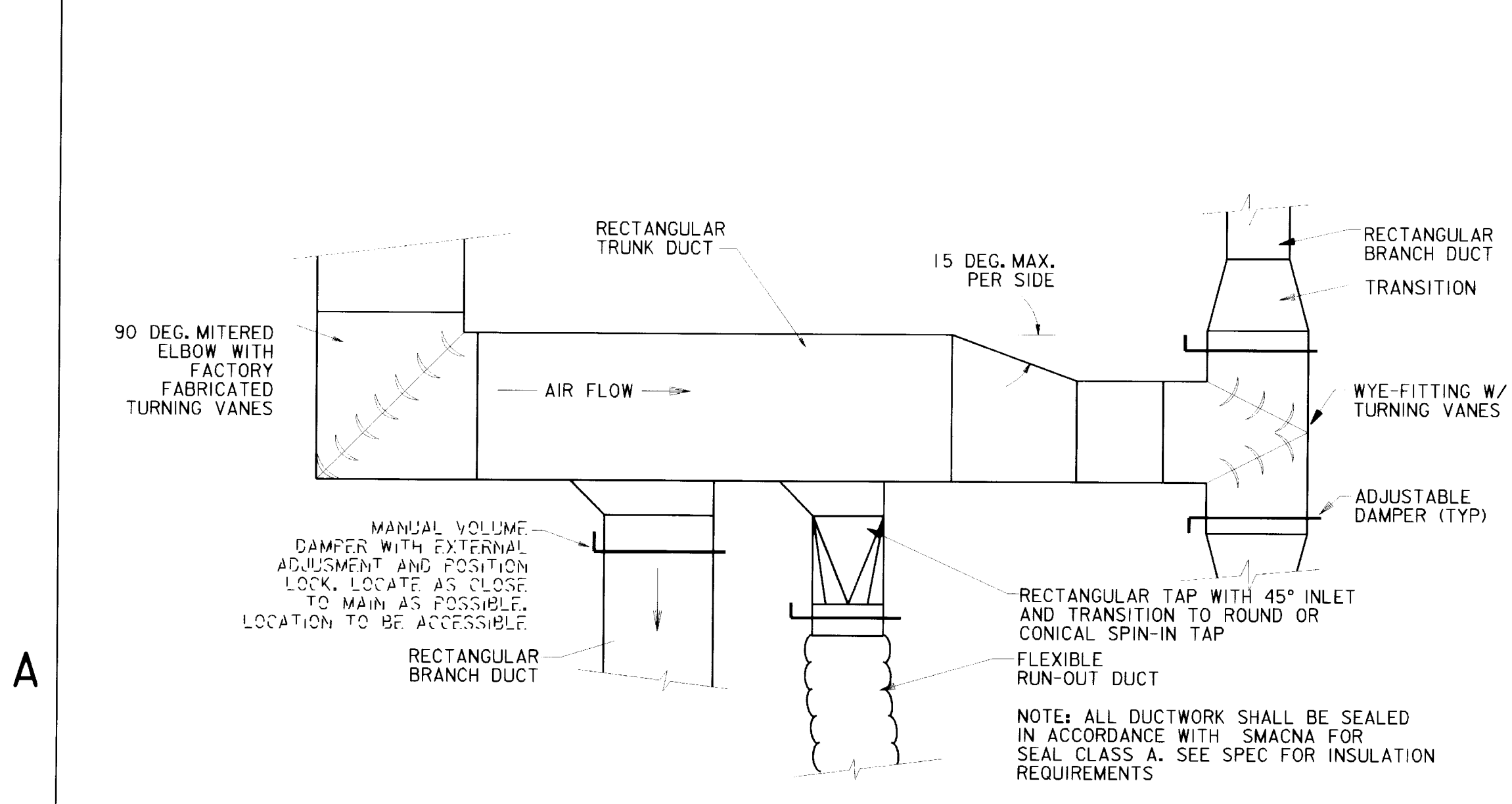
B TYPICAL LINEAR SLOT DIFFUSER DETAIL
M1 M2 M3 M10 NOT TO SCALE



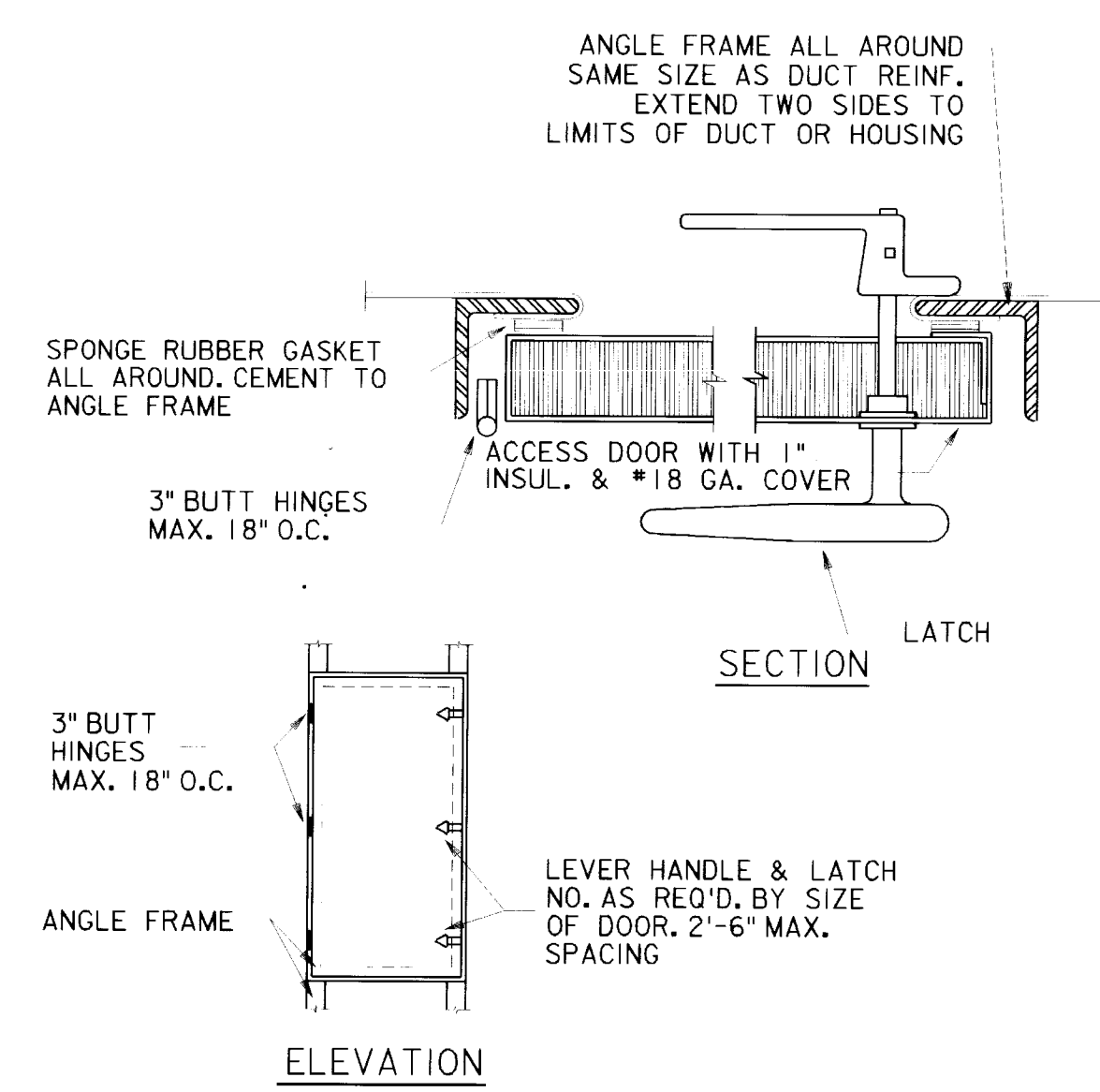
D TYPICAL INLINE EXHAUST FAN DETAIL
M1 M2 M3 M10 NOT TO SCALE



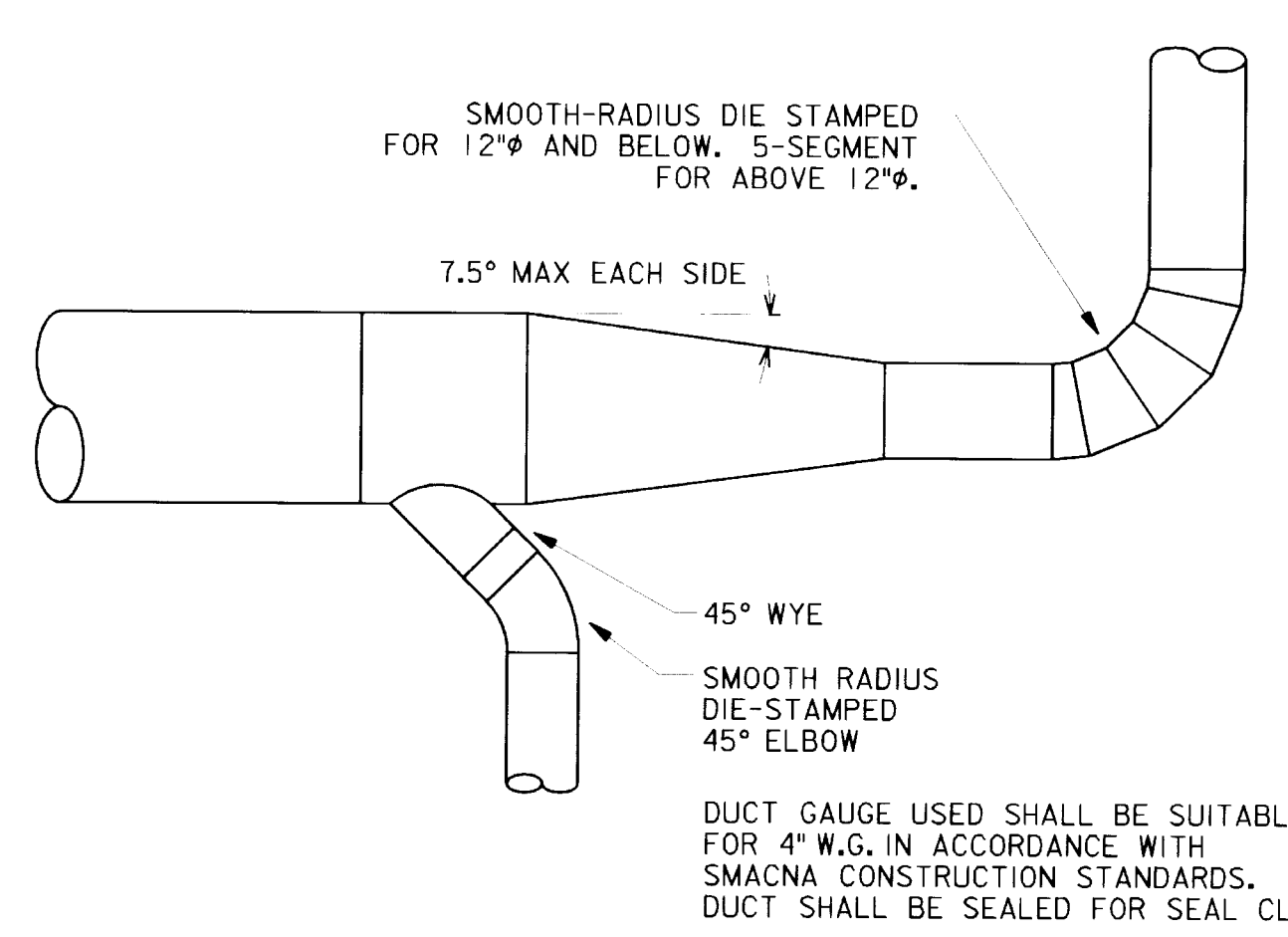
E RELIEF PLENUM DETAIL
M1 M2 M3 M10 NOT TO SCALE



F TYPICAL LOW PRESSURE DUCT CONSTRUCTION DETAIL
GEN M10 NOT TO SCALE



G TYPICAL DUCT ACCESS PANEL
GEN M10 NOT TO SCALE



H TYPICAL HIGH PRESSURE DUCT FITTING DETAIL
GEN M10 NOT TO SCALE

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	MECHANICAL DETAILS	
Checked by:	JBT	Scale: NO SCALE	Sheet number: Plot Scale: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: C501M010.2D
		Dwg. No.: AF 141-753-01	File No.:

63-000-
156-124
M-10

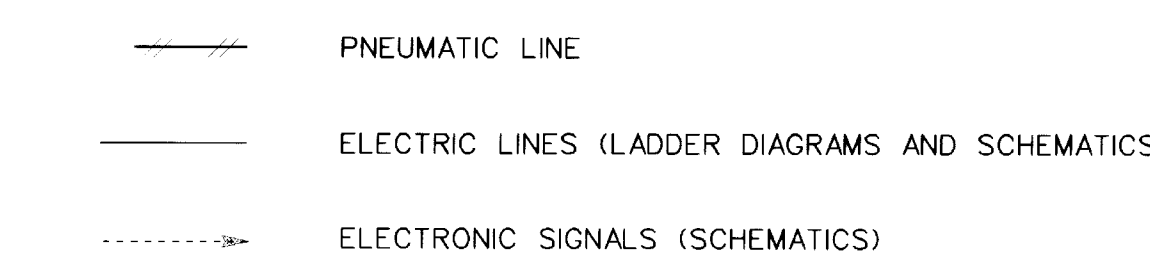
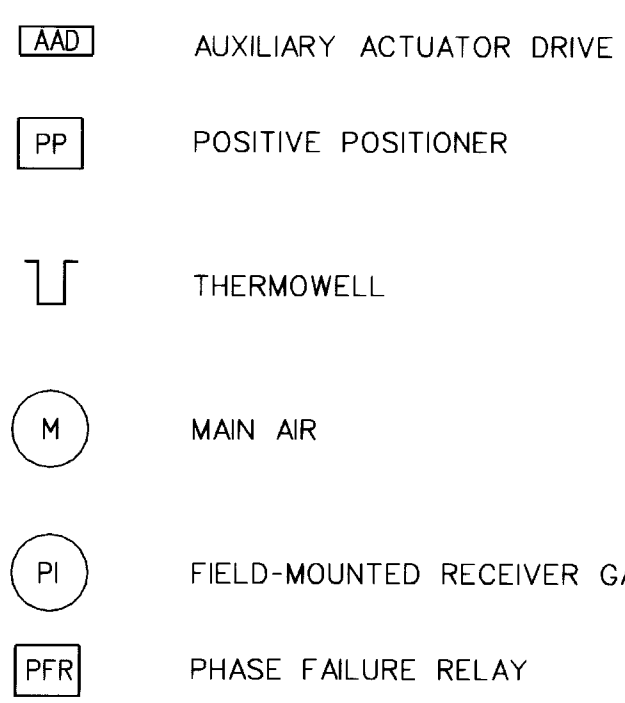
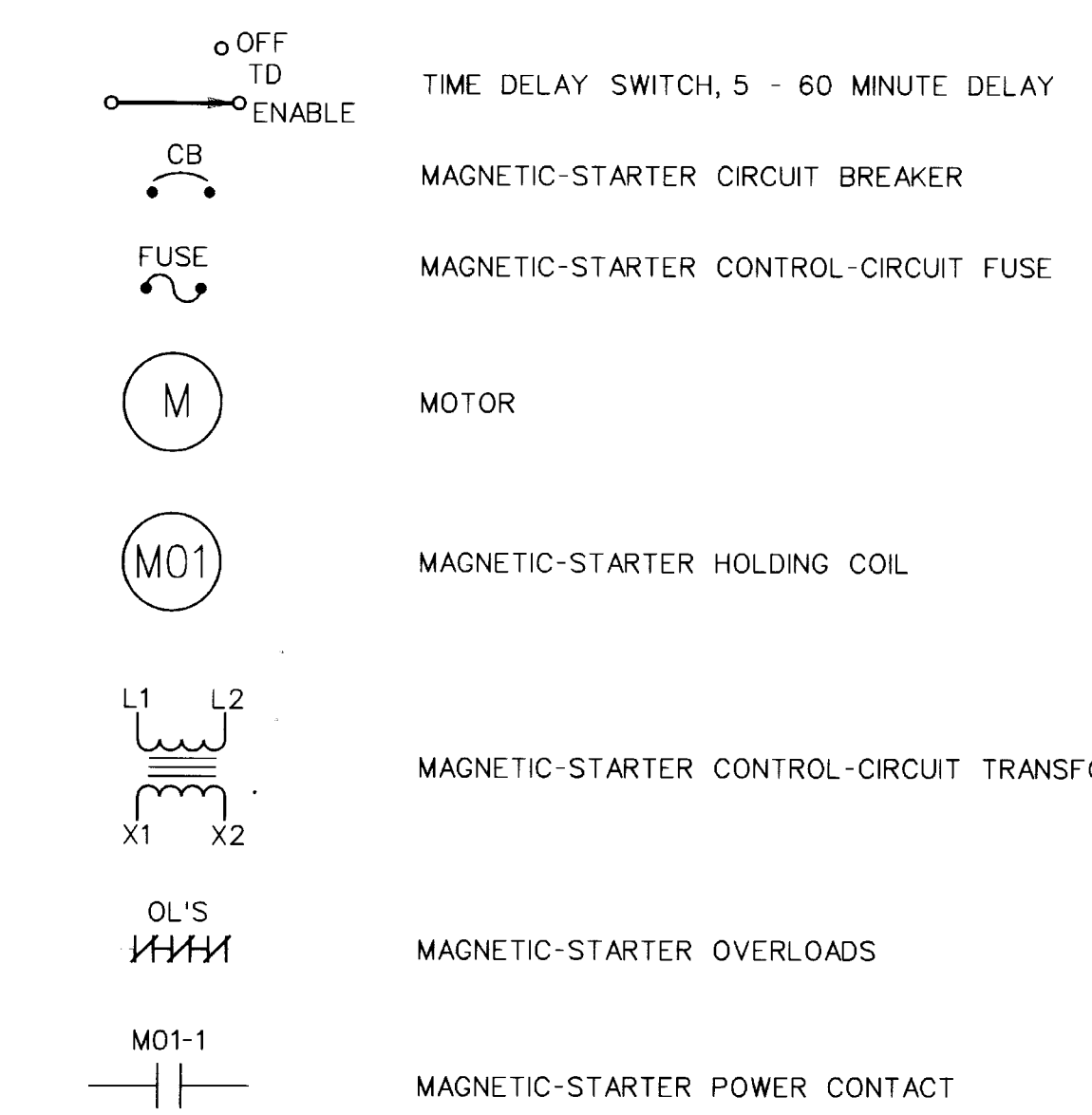
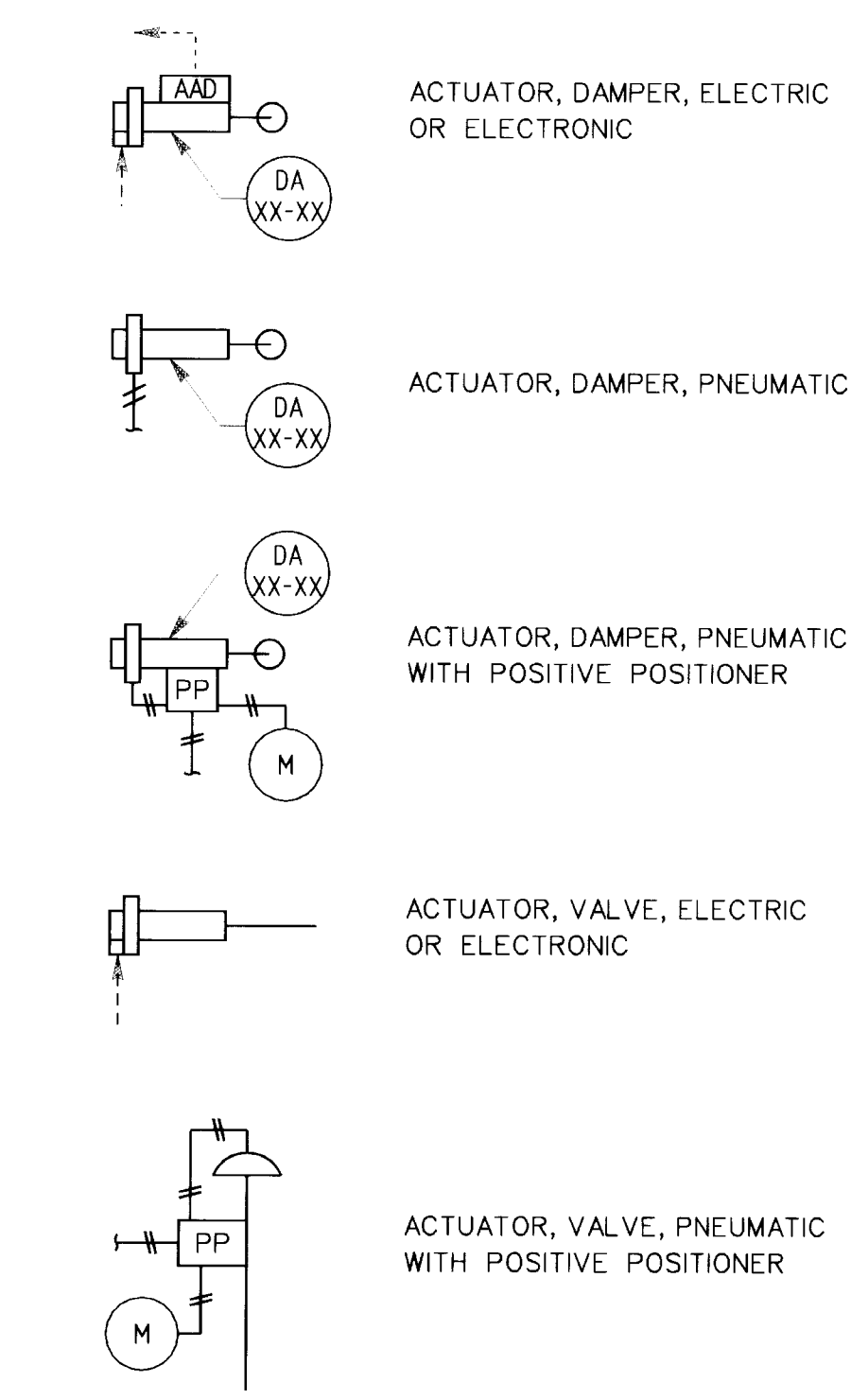
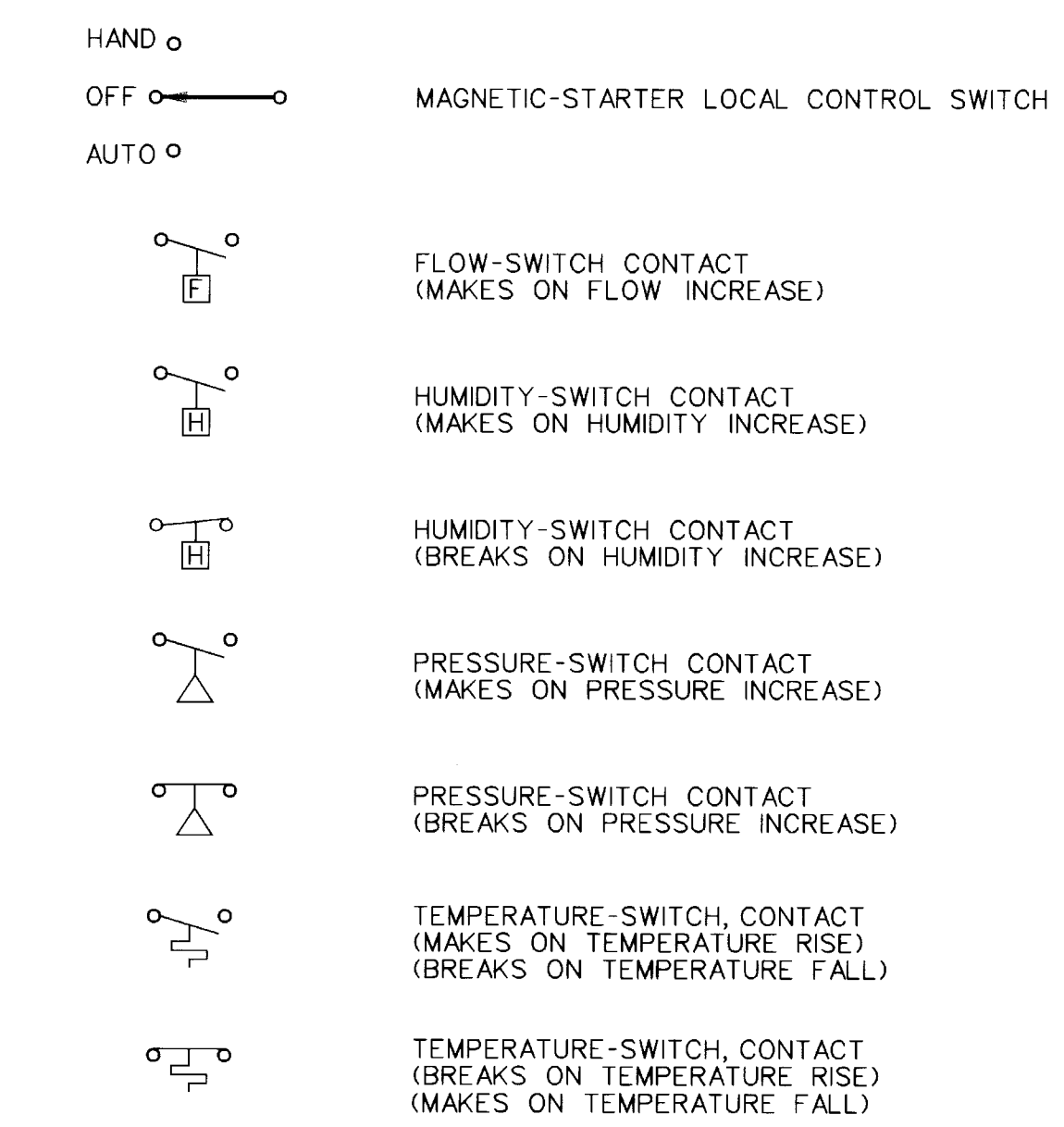
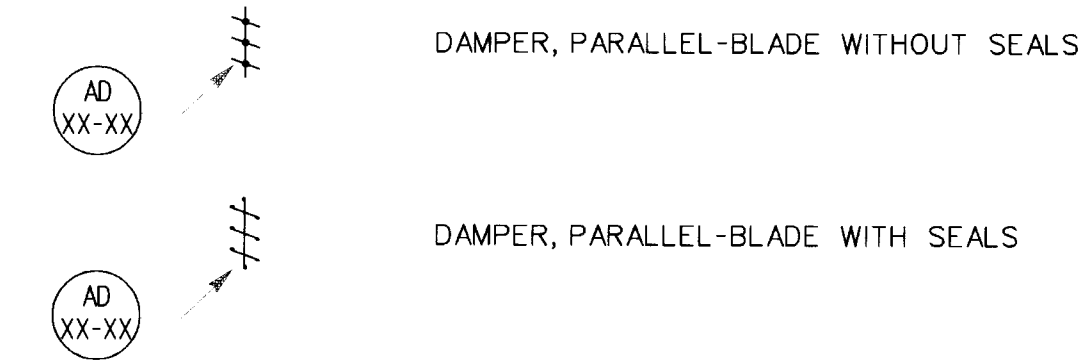
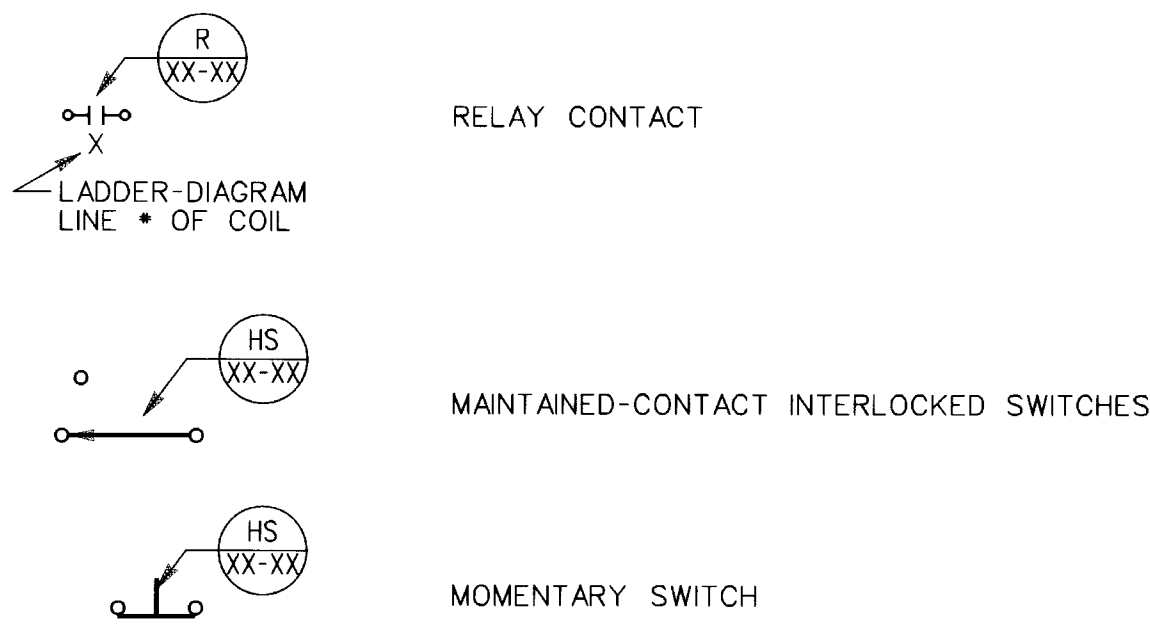
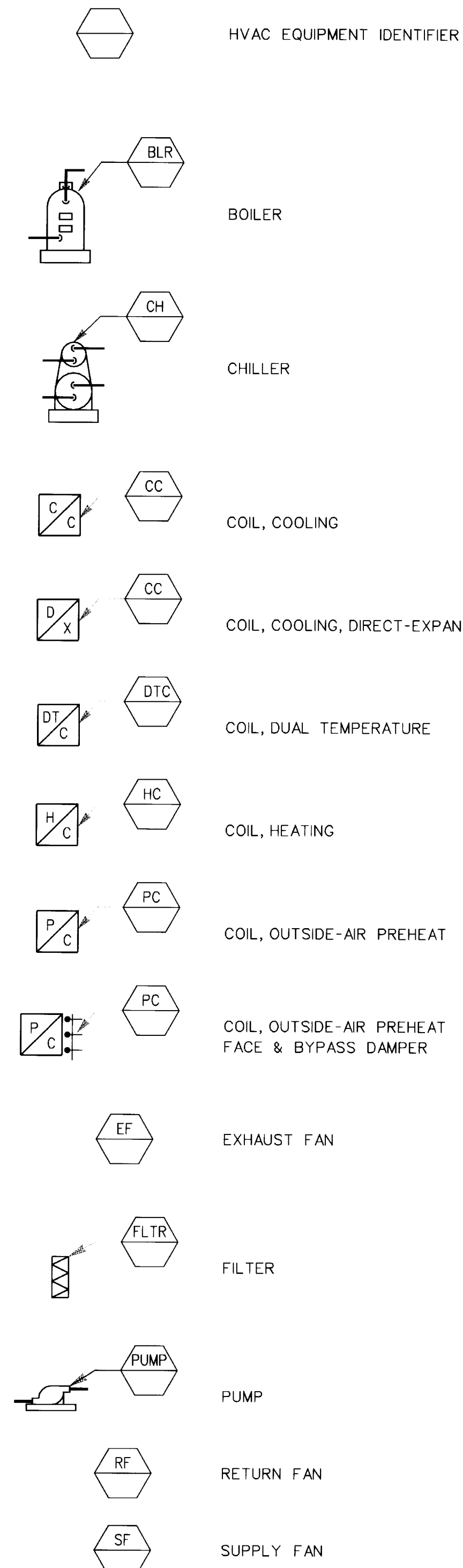
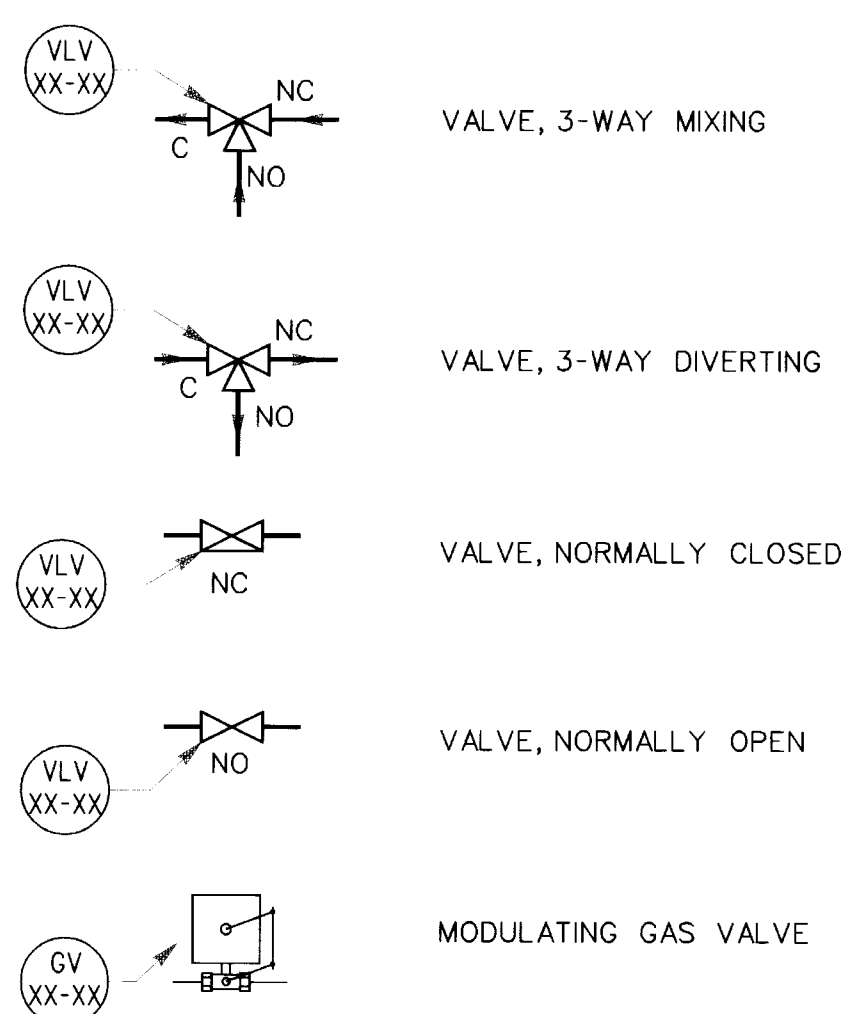
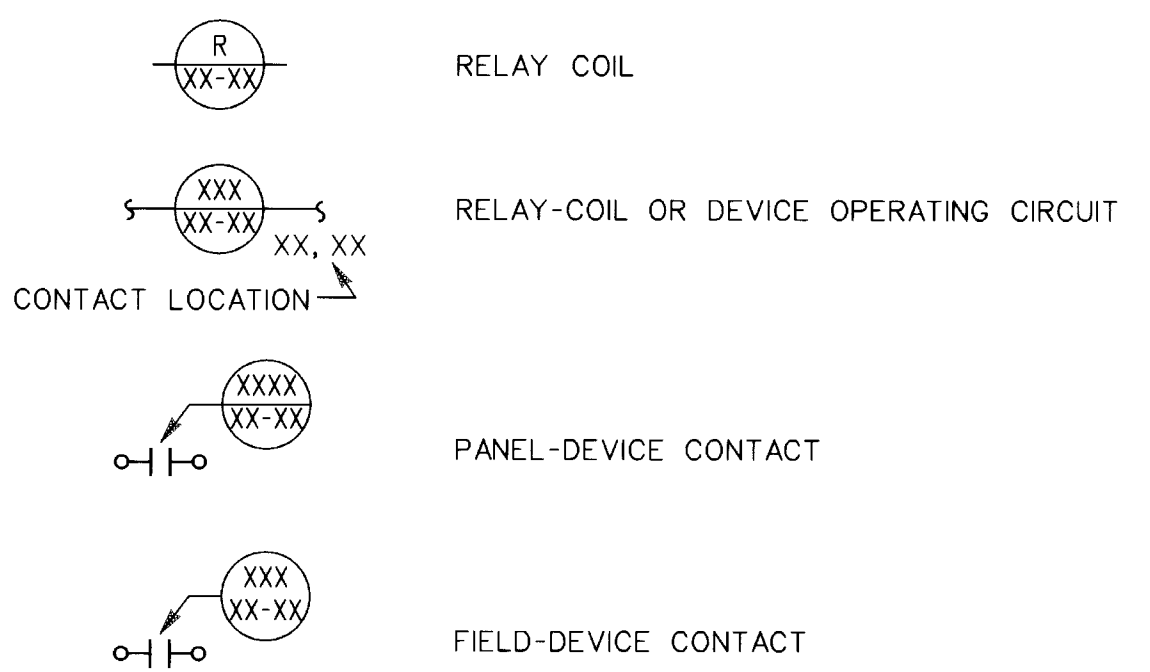
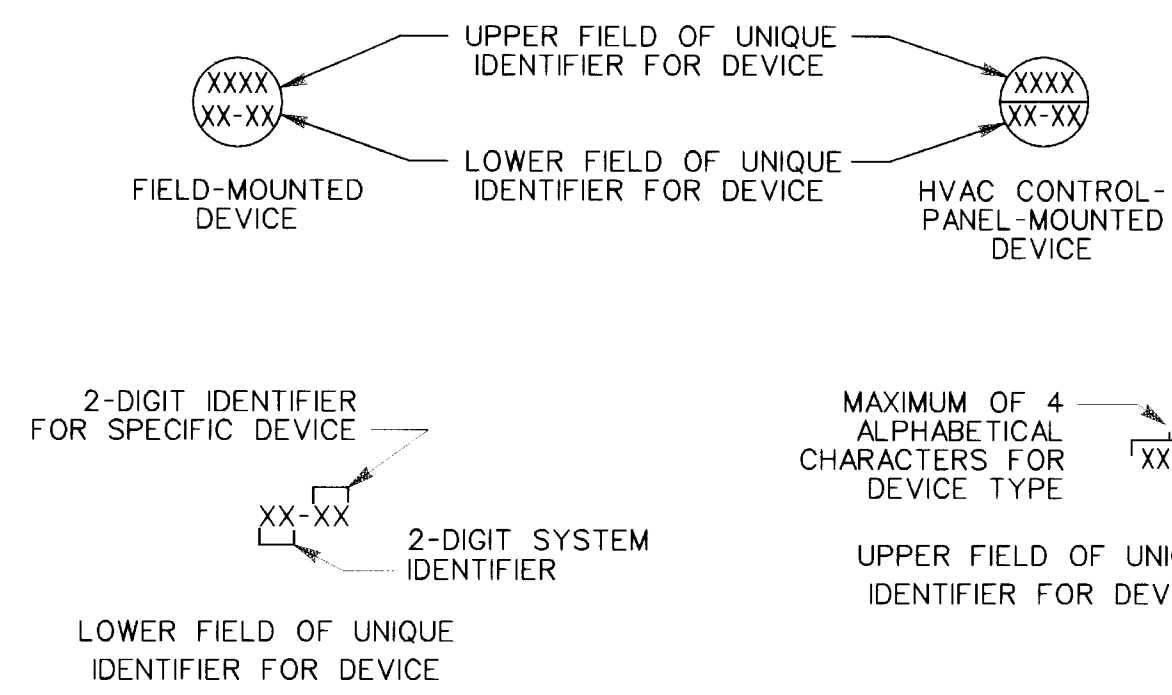
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AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

NOTE: SEE SHEET E-0 FOR ADDITIONAL ELECTRICAL SYMBOLS

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	NORTH DAKOTA FY97
Drawn by:	JBT	TEMPERATURE CONTROLS LEGEND	
Checked by:	JBT	Scale: NO SCALE	Sheet number: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G5011001.2D
		Dwg. No.: AF 141-753-01	File No.:

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63-000-156-125 TC-1



C

NOTE: REPLACE "XX" WITH "01" FOR AHU-1 AND "02" FOR AHU-2

NOTES:
1. REPLACE "XX" WITH "01" FOR AHU-1 AND "02" FOR AHU-2, REPLACE "ZZ" WITH
APPROPRIATE VAV BOX IDENTIFIER
2. TERMINAL UNIT VALVES SHALL BE THE SAME SIZE AS THE PIPING RUNOUT TO THE
TERMINAL UNIT.

B

[illegible]

COOLING COIL

OCCUPIED AND VENTILATION ZONE MODES: THE CONTROL VALVE SHALL BE MODULATED BY THE DDC SYSTEM FROM SIGNAL OF A TEMPERATURE SENSING ELEMENT AND TRANSMITTER LOCATED IN THE COIL DISCHARGE AIR TO MAINTAIN 56 DEGREES F.

THE YAC SYSTEM SHALL MONITOR THE TEMPERATURES FROM THE SIGNAL OF A TEMPERATURE SENSING ELEMENT AND TRANSMIT THE IN THE MIXED AIR DUCTWAY TO MAINTAIN THE SETPOINT AS DESCRIBED IN MINIMUM OUTDOOR AIR CONDITION CONTROL CONTRACT.

ALL MODES - THE CONTROL DAMPER OF THE VAV BOX SHALL MODULATE IN RESPONSE TO THE SIGNAL FROM A FLOW SENSING ELEMENT AT THE DISCHARGE OR INLET OF THE VAV BOX TO A MICROPROCESSOR BASED VAV BOX VELOCITY CONTROLLER. THE VELOCITY CONTROLLER SHALL CONTROL THE BOX DAMPER FROM THE MINIMUM "LOW" POSITION ON TO THE FULL FLOW POSITION FROM THE SIGNAL OF A SPACE TEMPERATURE SENSING ELEMENT LOCATED AS SHOWN TO MAINTAIN 77 DEGREES F. FOR UNITS WITH HEAT NG COILS, WHEN THE SPACE TEMPERATURE WAS DROPPED THROUGH DEADBAND, THE DUCT HEATER COIL SHALL BE MODULATED TO MAINTAIN 70 DEGREES F.



NO SCALE

[illegible]

A. MOSES - THE PERIMETER RADIANT COILING PANEL 2-POSITION, 3-WAY VALVE(S) SHALL BE OPENED AND CLOSED TO MAINTAIN A SPACE TEMPERATURE OF 70 DEGREES F.

ALL MODES - SMOKE DETECTOR IN THE SUPPLY-AIR AND EXHAUST (BLOCKWORK) SHALES OF THE SUPPLY FAN AND INITIATE A SMOKE ALARM. IF SMOKE IS DETECTED AT EITHER LOCATION, THE DDC SYSTEM SHALL TIME-START AND SCHEDULE THE EVENT. RESTARTING THE SUPPLY FAN SHALL REQUIRE MANUAL RESET AFTER THE SMOKE DETECTION.

EXHAUST FAN (E-5) SHALL BE INTERLOCKED WITH A-1. EXHAUST FAN (E-6) SHALL BE INTERLOCKED WITH A-2.
THE EXHAUST FAN SHALL OPERATE DURING OCCUPIED MODE. THE EXHAUST FAN SHALL BE OFF DURING VENTILATION-
NIGHT AND UNOCCUPIED MODES. THE EXHAUST FAN VOTICIZED DAMPER SHALL OPEN WHEN THE EXHAUST FAN OPERATES.

THE CONTROL DRAWINGS SHOW THE GENERAL ARRANGEMENT OF THE HVAC CONTROLS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE SYSTEM IS PROPERLY INSTALLED TO CONTROL THE SPECIFIED UNDERFLOOR HEATING. IN THE SEQUENCE OF CONTROL, THE CONTRACTING OFFICER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR DIFFICULTIES WHICH SIGNIFICANTLY AFFECT THE WORK BEFORE PROCEEDING.

APRIL 2000
CONTRACT NO. DACA41-97-C-0020



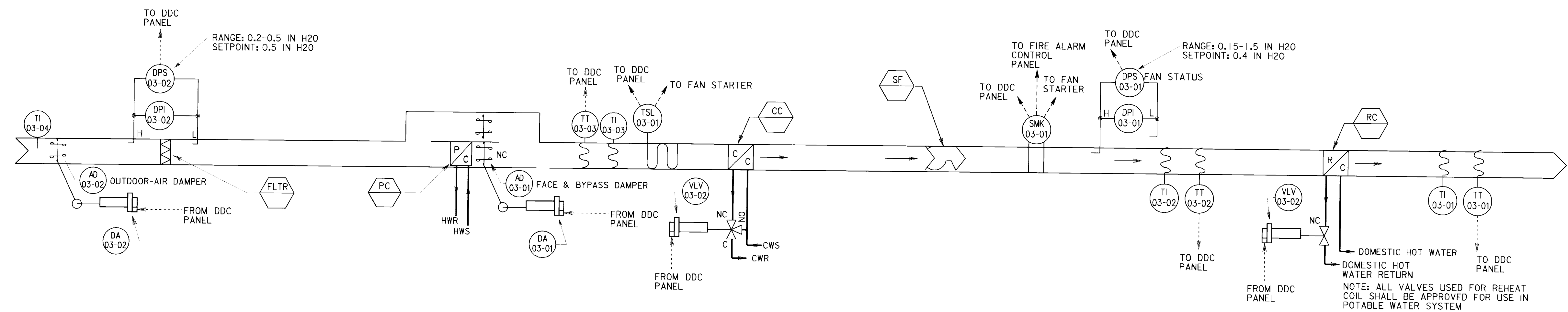
NOTE: REPLACE "XX" WITH "01" FOR AHU-1 AND "02" FOR AHU-2

B

156-126

TC-2

A

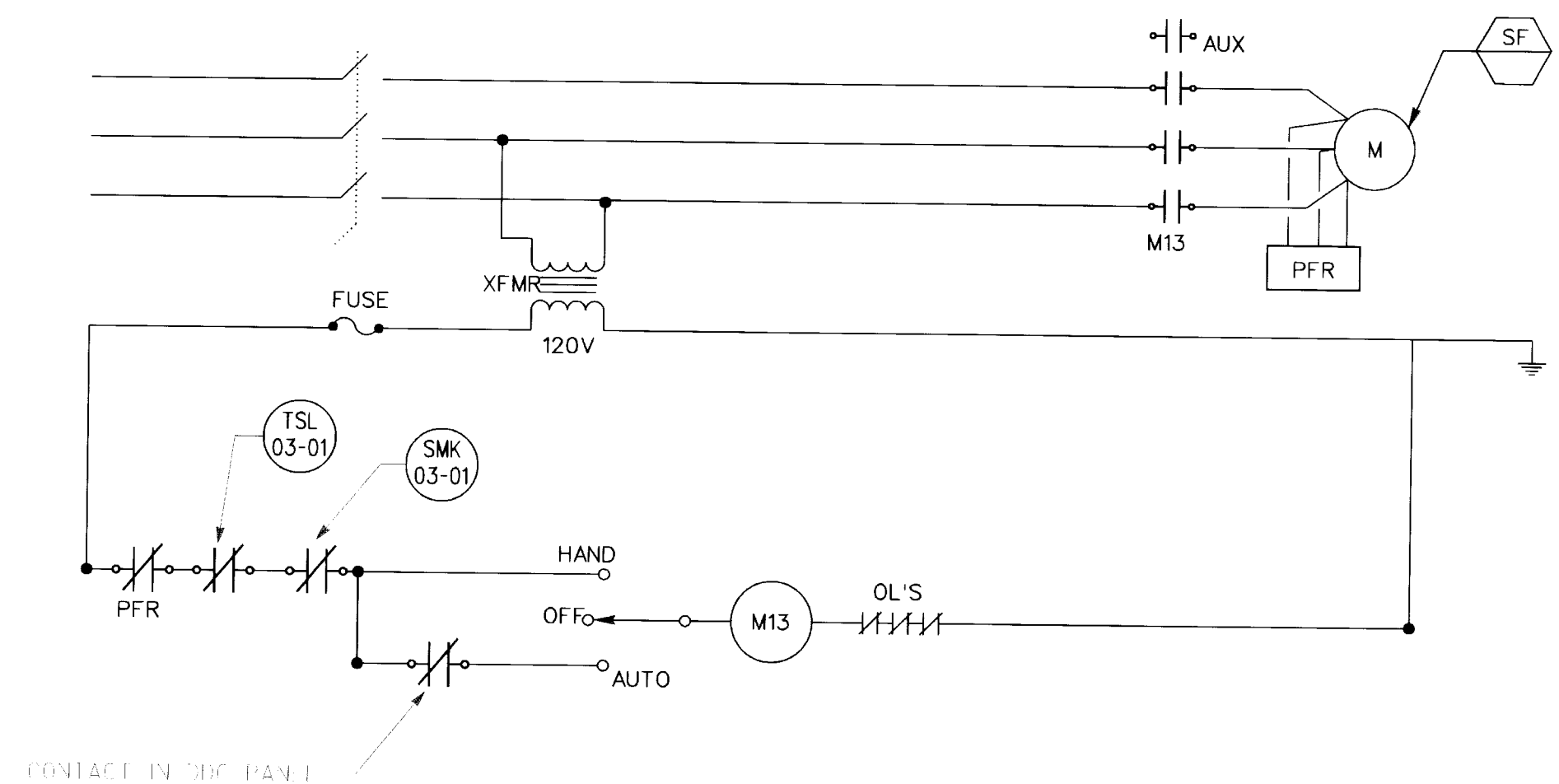


AHU-3 CONTROL SYSTEM SCHEMATIC

CONTROL VALVE SCHEDULE				
IDENTIFIER	FUNCTION	TYPE	RANGE	Cv
VLV-03-01	COOLING COIL VALVE	3-WAY, MODULATING	4 - 20mA	54
VLV-03-02	REHEAT COIL VALVE	2-WAY, MODULATING	4 - 20mA	16

AHU-3 SEQUENCE OF OPERATION

AHU-3 OUTDOOR AIR SUPPLY UNIT CONTROL SEQUENCE OF OPERATION
OCCUPIED, UNOCCUPIED, AND VENTILATION-DELAY MODES
AT 0700, THE DDC SYSTEM SHALL PLACE THE SYSTEM IN THE OCCUPIED MODE. THE OUTDOOR AIR DAMPER SHALL OPEN.
AT 1800, THE DDC SYSTEM SHALL PLACE THE CONTROL SYSTEM IN THE UNOCCUPIED MODE OF OPERATION.
OUTDOOR AIR DAMPER
OCCUPIED MODE - THE OUTDOOR-AIR DAMPER SHALL BE OPEN.
UNOCCUPIED MODE - THE OUTDOOR AIR DAMPER SHALL BE CLOSED.
SUPPLY-FAN CONTROL
OCCUPIED MODE - THE SUPPLY FAN SHALL START AND OPERATE CONTINUOUSLY.
UNOCCUPIED MODE - THE SUPPLY FAN SHALL BE OFF.
A PRESSURE SWITCH IN THE SUPPLY DUCTWORK SHALL DETERMINE THE FAN OPERATING STATUS AND INITIATE A FAN FAILURE ALARM IF THE SYSTEM LOSES STATIC PRESSURE DURING THE OCCUPIED OR VENTILATION DELAY MODE. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENTS.
FILTER
A DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER SHALL INITIATE A FILTER ALARM WHEN THE PRESSURE DROP ACROSS THE FILTER REACHES 0.5 INCHES. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT.
FREEZE PROTECTION
ALL MODES - A FREEZESTAT, LOCATED AS SHOWN, SHALL STOP THE SUPPLY FAN, CAUSE THE OUTDOOR-AIR DAMPER TO RETURN TO NORMAL POSITION, AND SHALL INITIATE A LOW TEMPERATURE ALARM IF THE TEMPERATURE DROPS BELOW 35 DEGREES F. RETURN TO THE NORMAL MODE OF OPERATION SHALL REQUIRE MANUAL RESET AT THE FREEZESTAT. THE DDC PANEL SHALL MONITOR THE FREEZESTAT THROUGH AUXILIARY CONTACTS AND SHALL INDICATE AN ALARM CONDITION WHEN THE FREEZESTAT TRIPS. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT.
COOLING COIL
OCCUPIED MODES - THE CONTROL VALVE SHALL BE MODULATED BY THE DDC SYSTEM FROM THE SIGNAL OF A TEMPERATURE SENSING ELEMENT AND TRANSMITTER LOCATED IN THE COIL DISCHARGE AIR TO MAINTAIN 57.7 DEGREES F.
UNOCCUPIED MODE - THE DDC SYSTEM SHALL BYPASS FLOW AROUND THE COOLING COIL.
PREHEATING COIL
OCCUPIED MODE - THE FACE AND BYPASS DAMPERS SHALL BE MODULATED BY THE DDC SYSTEM FROM THE SIGNAL OF A TEMPERATURE SENSING ELEMENT AND TRANSMITTER LOCATED IN THE COIL DISCHARGE AIR TO MAINTAIN 70.5 DEGREES F.
UNOCCUPIED MODE - THE FACE AND BYPASS DAMPERS SHALL BE UNCONTROLLED.
REHEAT COIL
OCCUPIED MODE - THE CONTROL VALVE SHALL BE MODULATED BY THE DDC SYSTEM FROM THE SIGNAL OF A TEMPERATURE SENSING ELEMENT AND TRANSMITTER LOCATED IN THE COIL DISCHARGE AIR TO MAINTAIN 70.0 DEGREES F.
UNOCCUPIED MODE - THE COIL SHALL BE UNCONTROLLED.
SMOKE CONTROL
ALL MODES - SMOKE DETECTORS IN THE SUPPLY-AIR DUCTWORK SHALL STOP THE SUPPLY FAN AND INITIATE A SMOKE ALARM IF SMOKE IS DETECTED. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT. RESTARTING THE SUPPLY FAN SHALL REQUIRE MANUAL RESET AT THE SMOKE DETECTOR.



SUPPLY FAN WIRING DIAGRAM
NO SCALE

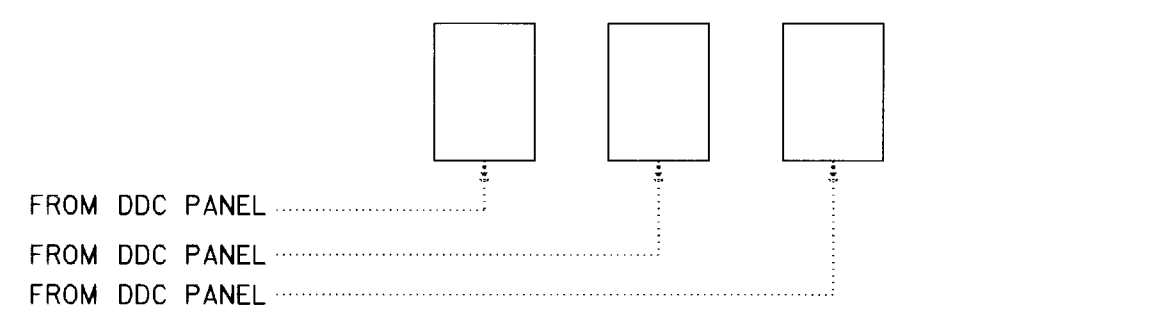
AS-BUILT DRAWINGS

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GENERAL NOTE

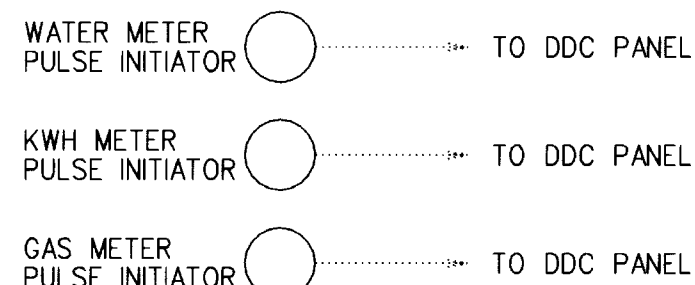
THE CONTROL DRAWINGS SHOW THE GENERAL ARRANGEMENT OF THE HVAC CONTROLS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSURE THAT THE SYSTEM IS PROPERLY INSTALLED TO CONTROL THE SYSTEM AS SPECIFIED UNDER THE SEQUENCE OF CONTROL. THE CONTRACTING OFFICER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR DIFFICULTIES WHICH SIGNIFICANTLY AFFECT THE WORK BEFORE PROCEEDING.

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	AHU-3 CONTROL SCHEMATICS	
Checked by:	JBT	Scale: AS SHOWN	Sheet numbers: Plot Scale: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G5011003.2D
		Dwg. No.: AF 141-753-01	File No.:



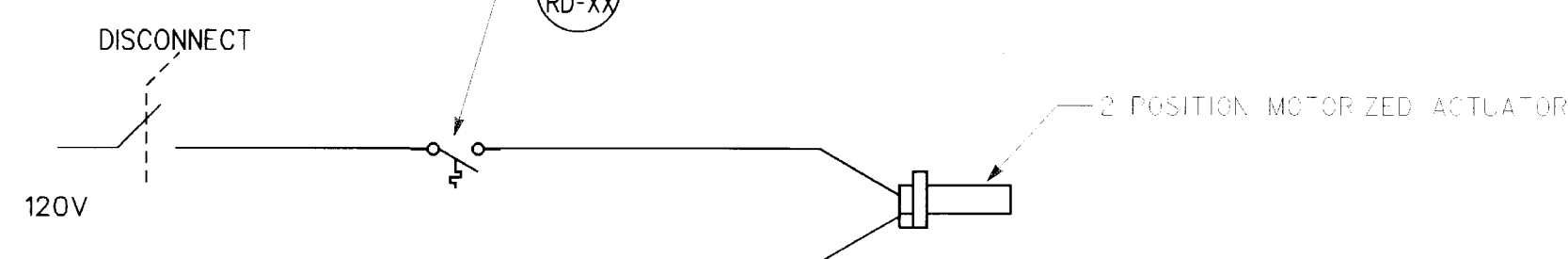
EXTERIOR LIGHTING CONTROL

SEE SHEET C-21 FOR EXTERIOR LIGHTING CONTROL DETAIL. THE DDC PANEL SHALL BE PROGRAMMED FOR INDIVIDUAL ON-OFF TIMES FOR EACH CONTACTOR. THE PROGRAM SHALL TAKE INTO ACCOUNT THE CHANGING LENGTH OF DAYTIME OR SHALL USE AN INPUT FROM THE PHOTOCELL TO DETERMINE IF IT IS DARK ENOUGH TO TURN ON THE EXTERIOR LIGHTING.



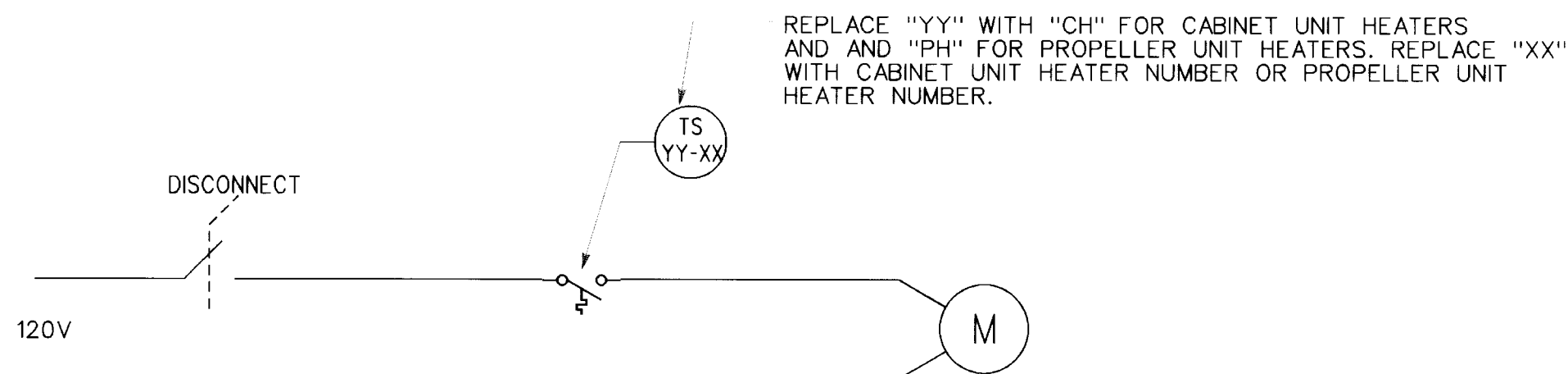
UTILITY MONITORING

REPLACE "XX" WITH RADIANT HEATER NUMBER.



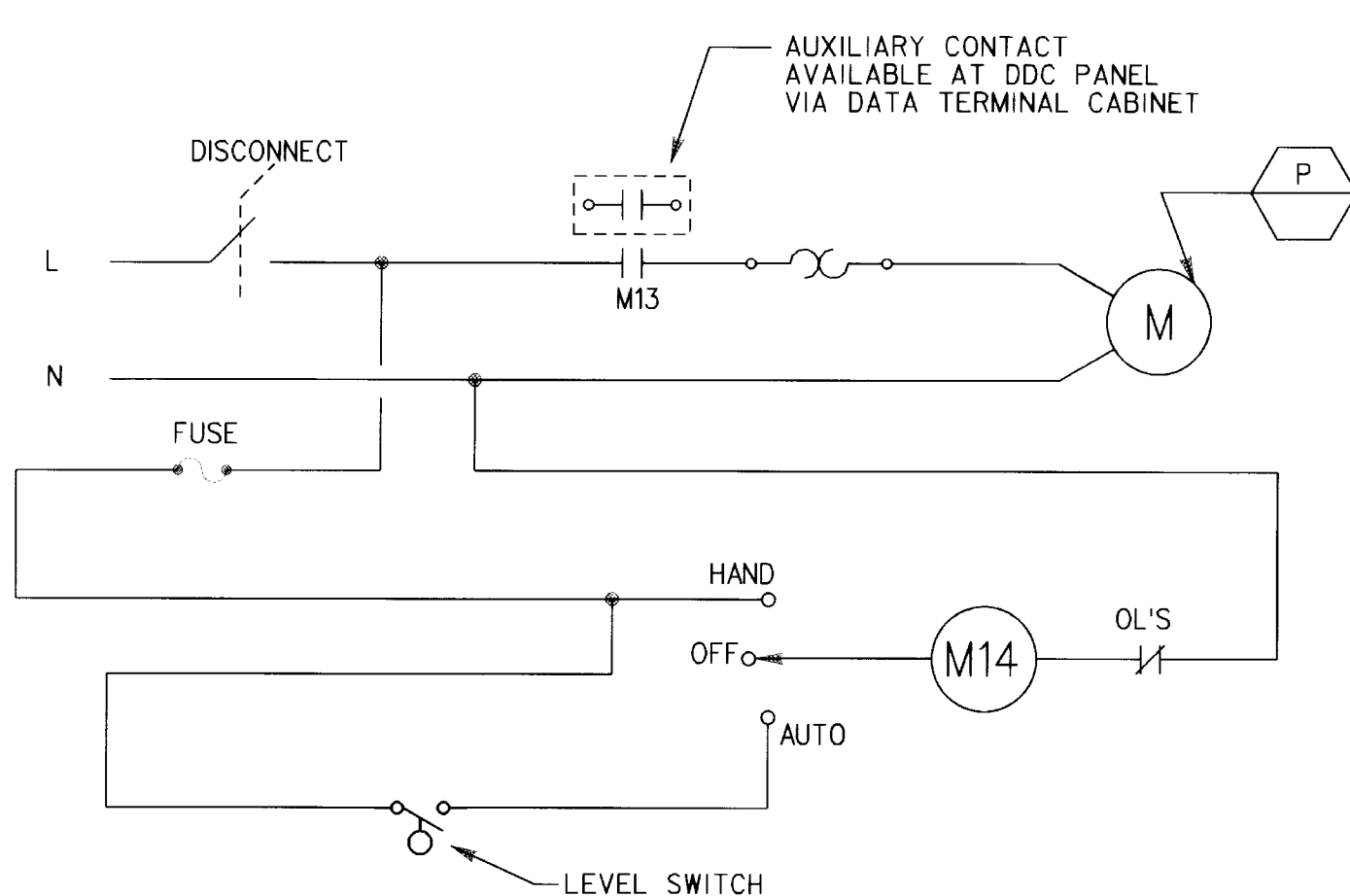
TYPICAL RADIANT HEATING PANEL WIRING DIAGRAM

NO SCALE



TYPICAL CABINET UNIT HEATER AND PROPELLER UNIT HEATER WIRING DIAGRAM

NO SCALE

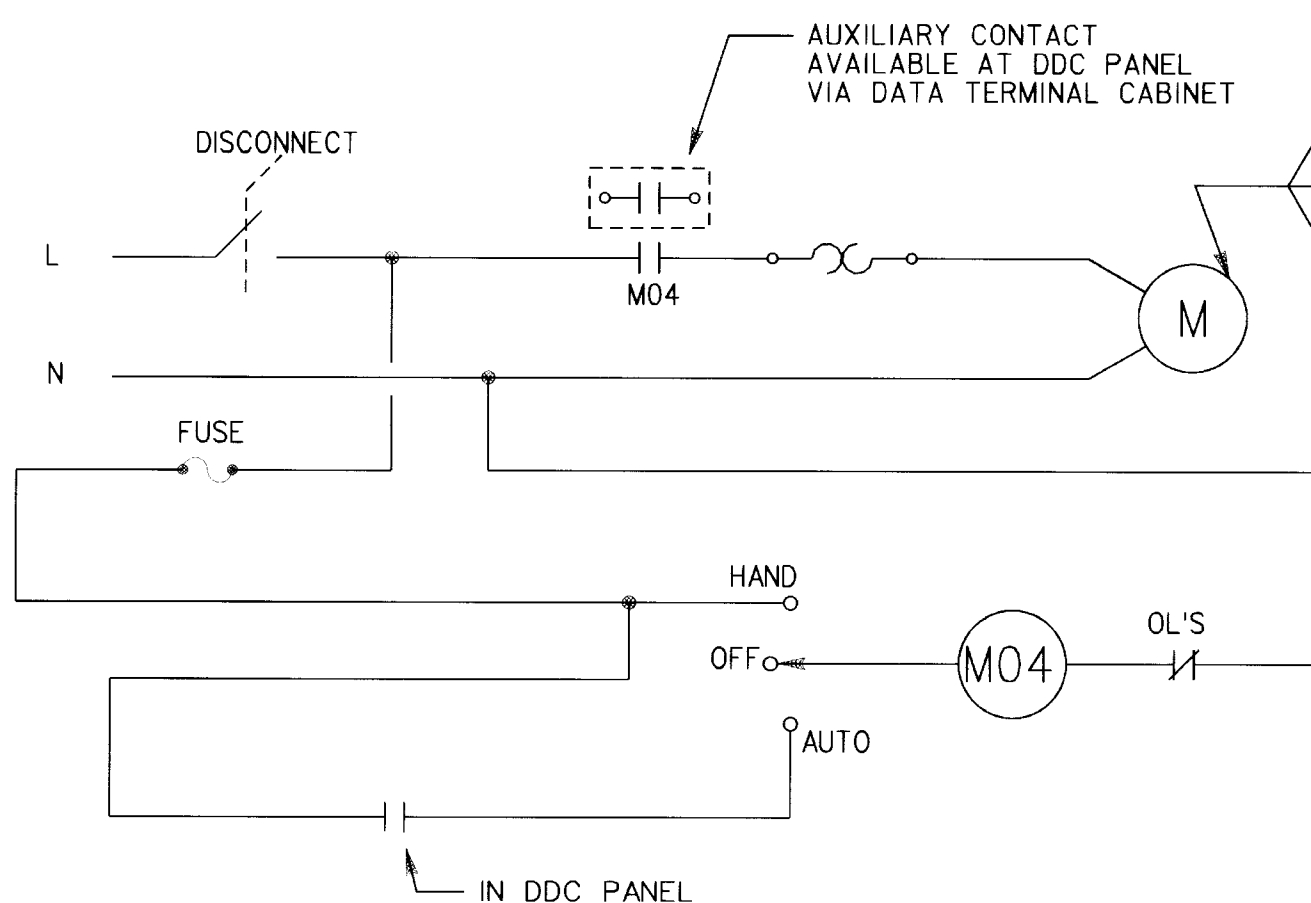
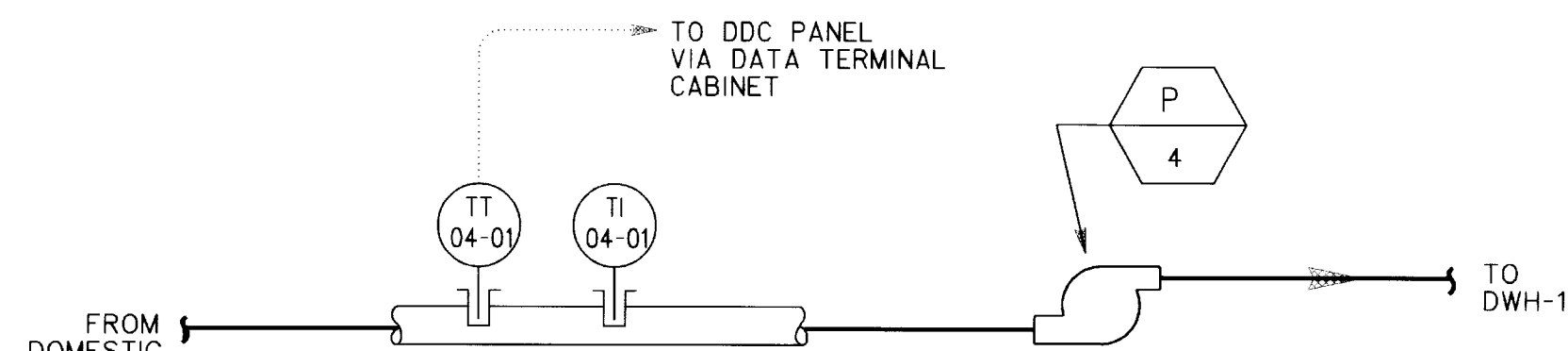


ELEVATOR PIT SUMP PUMP P-9 WIRING DIAGRAM

NO SCALE

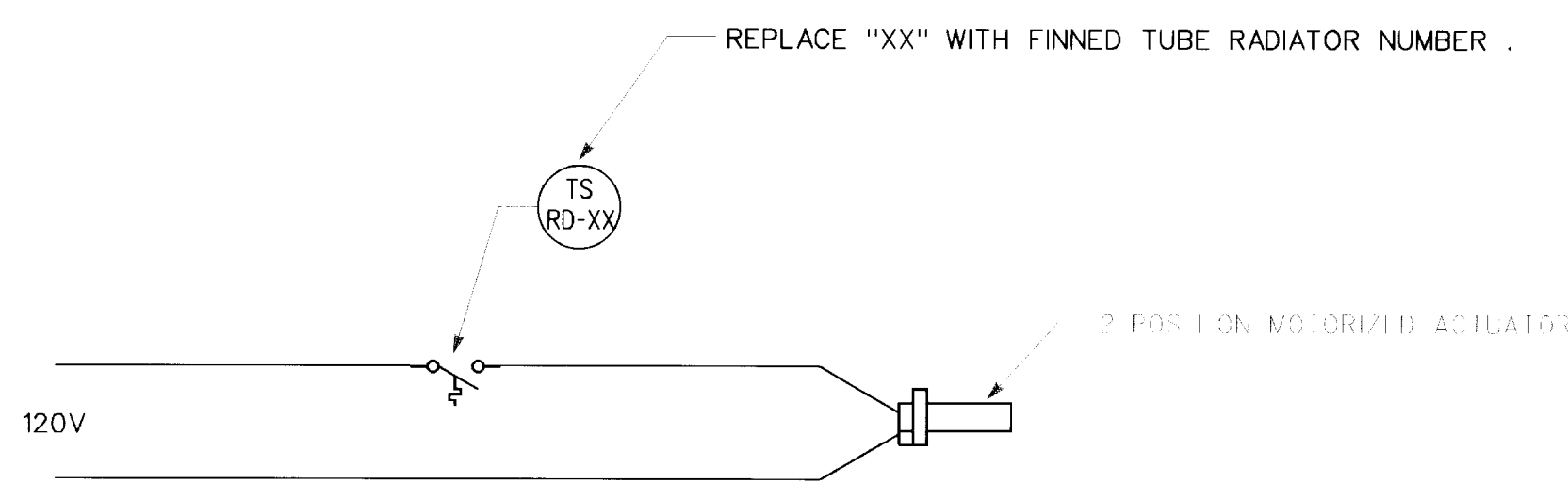
GENERAL NOTE

THE CONTROL DRAWINGS SHOW THE GENERAL ARRANGEMENT OF THE HVAC CONTROLS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSURE THAT THE SYSTEM IS PROPERLY INSTALLED TO CONTROL THE SYSTEM AS SPECIFIED UNDER THE SEQUENCE OF CONTROL. THE CONTRACTING OFFICER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR DIFFICULTIES WHICH SIGNIFICANTLY AFFECT THE WORK BEFORE PROCEEDING.



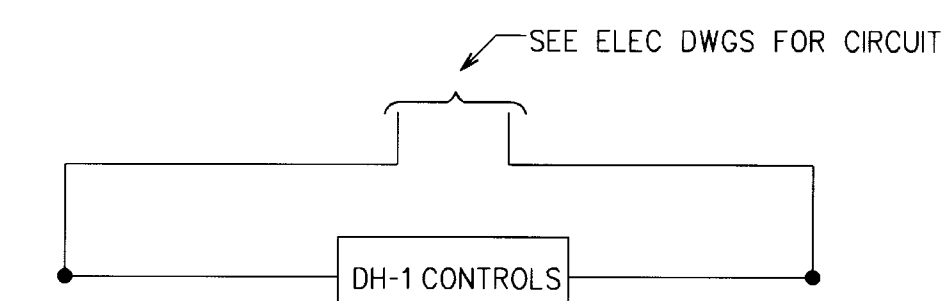
RECIRC PUMP P-4 SCHEMATIC AND WIRING DIAGRAM

NO SCALE



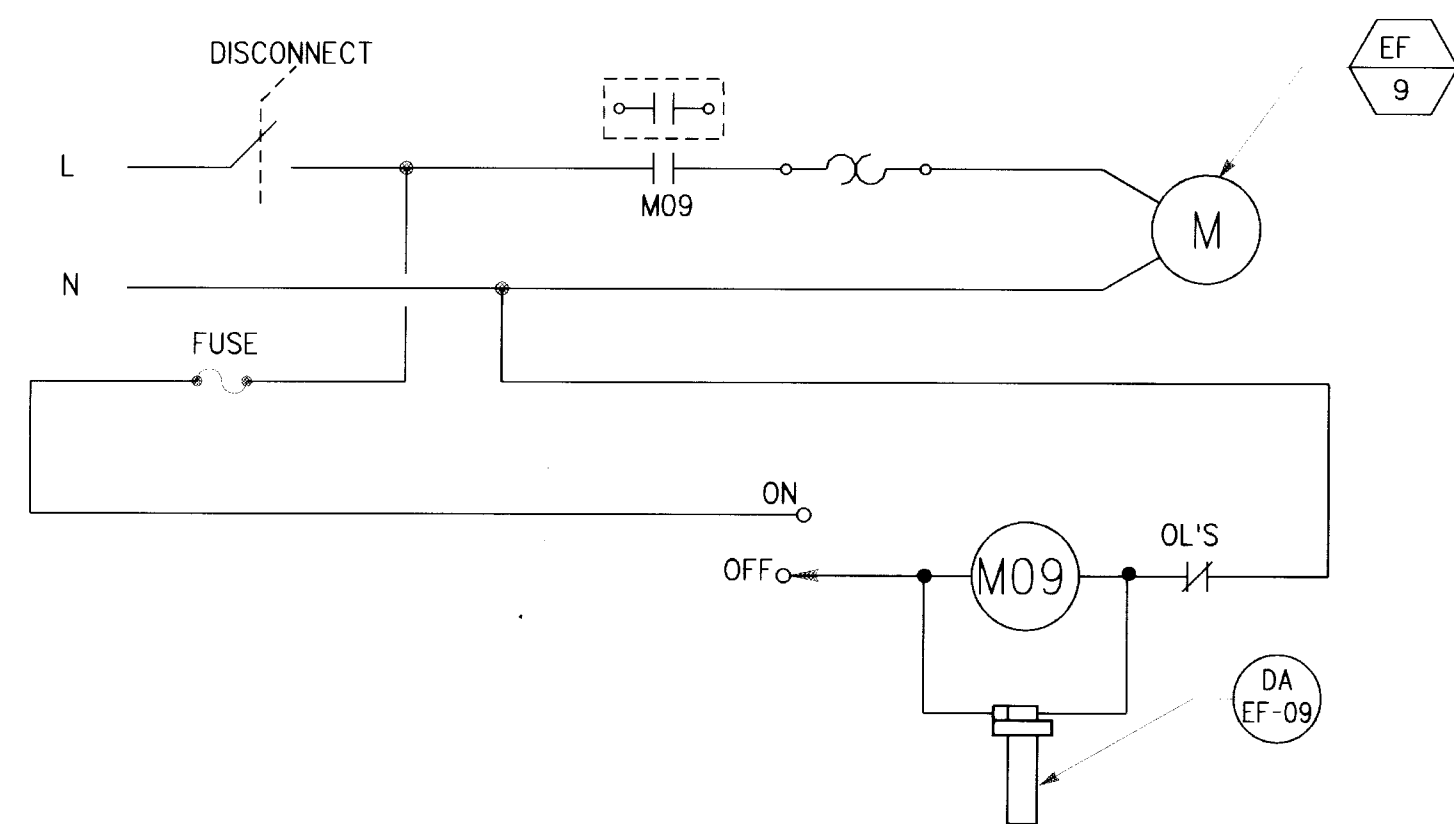
TYPICAL FINNED TUBE RADIATOR WIRING DIAGRAM

NO SCALE



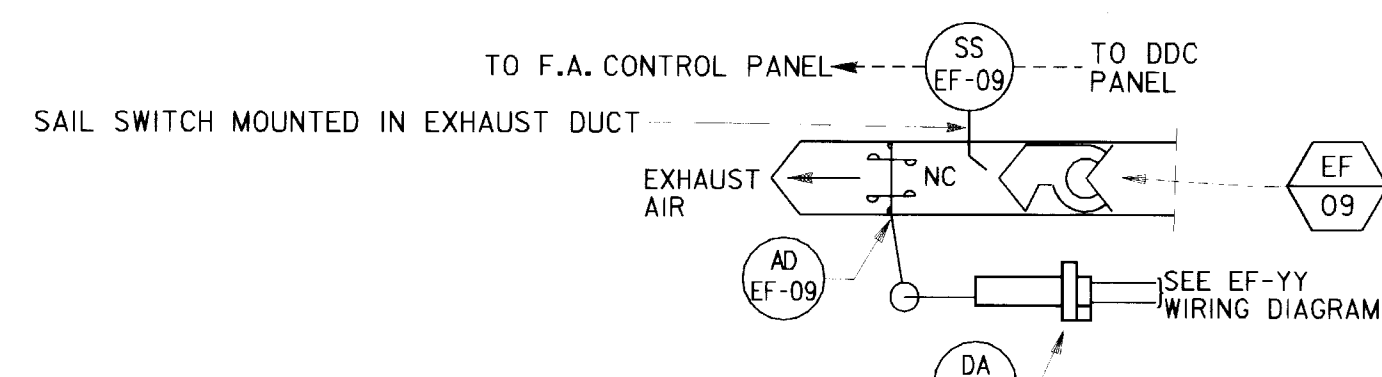
DOM. WATER HEATER CONTROLS

NO SCALE



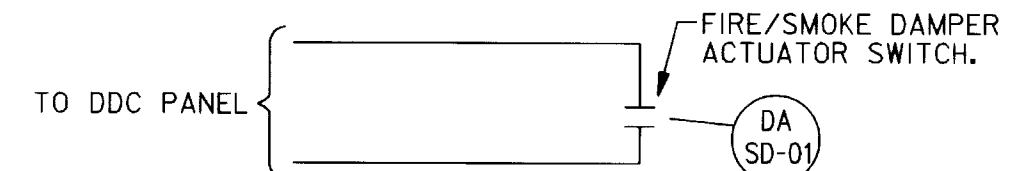
EF-9 WIRING DIAGRAM

NO SCALE



EF-9 SCHEMATIC

NO SCALE



COMB. FIRE/SMOKE DAMPER STATUS

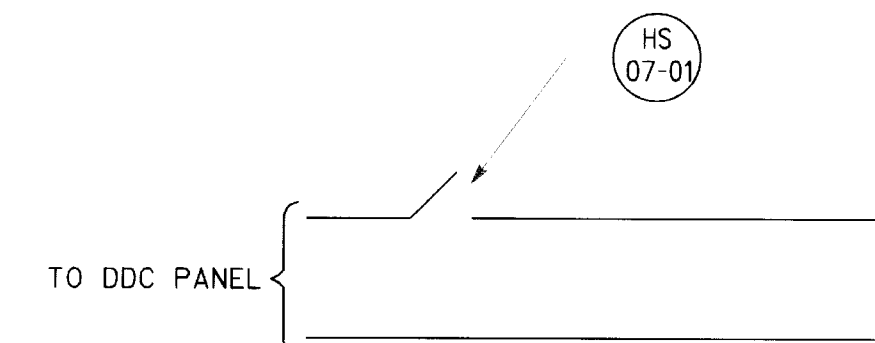
THE DDC PANEL SHALL SIGNAL AN ALARM WHENEVER THE COMBINATION FIRE/SMOKE DAMPER ACTUATOR END SWITCH INDICATES THAT THE DAMPER HAS CLOSED. THE DDC PANEL SHALL TIME STAMP AND STORE THE EVENT.

PUMP P-4 SEQUENCE OF OPERATION

P-4 (DOMESTIC RECIRC PUMP)

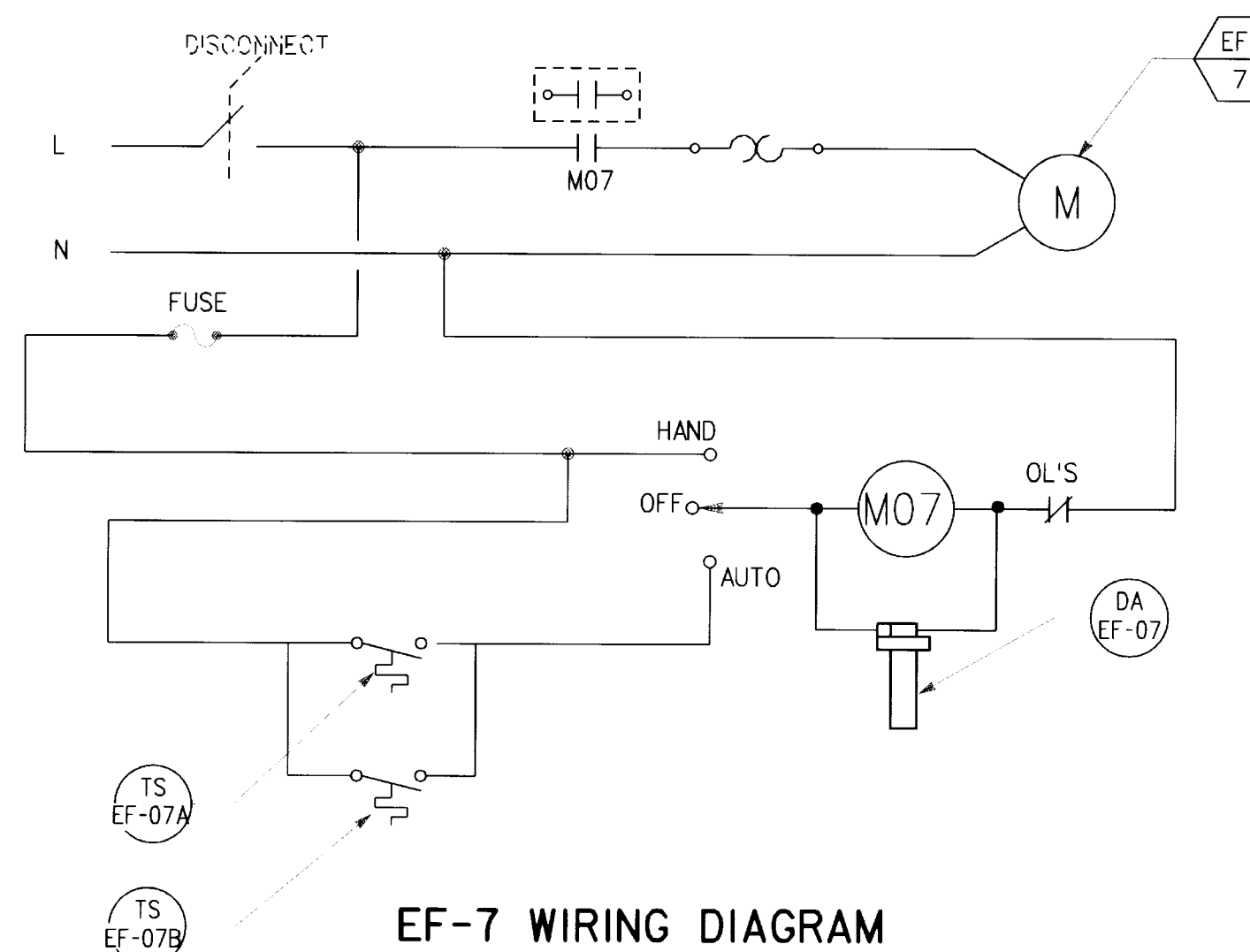
ON A SIGNAL FROM THE DDC PANEL, THE PUMP SHALL START AND RUN CONTINUOUSLY.

THE DDC PANEL SHALL SIGNAL AN ALARM IF THE RETURN WATER TEMPERATURE FALLS BELOW 100 DEGREES F.



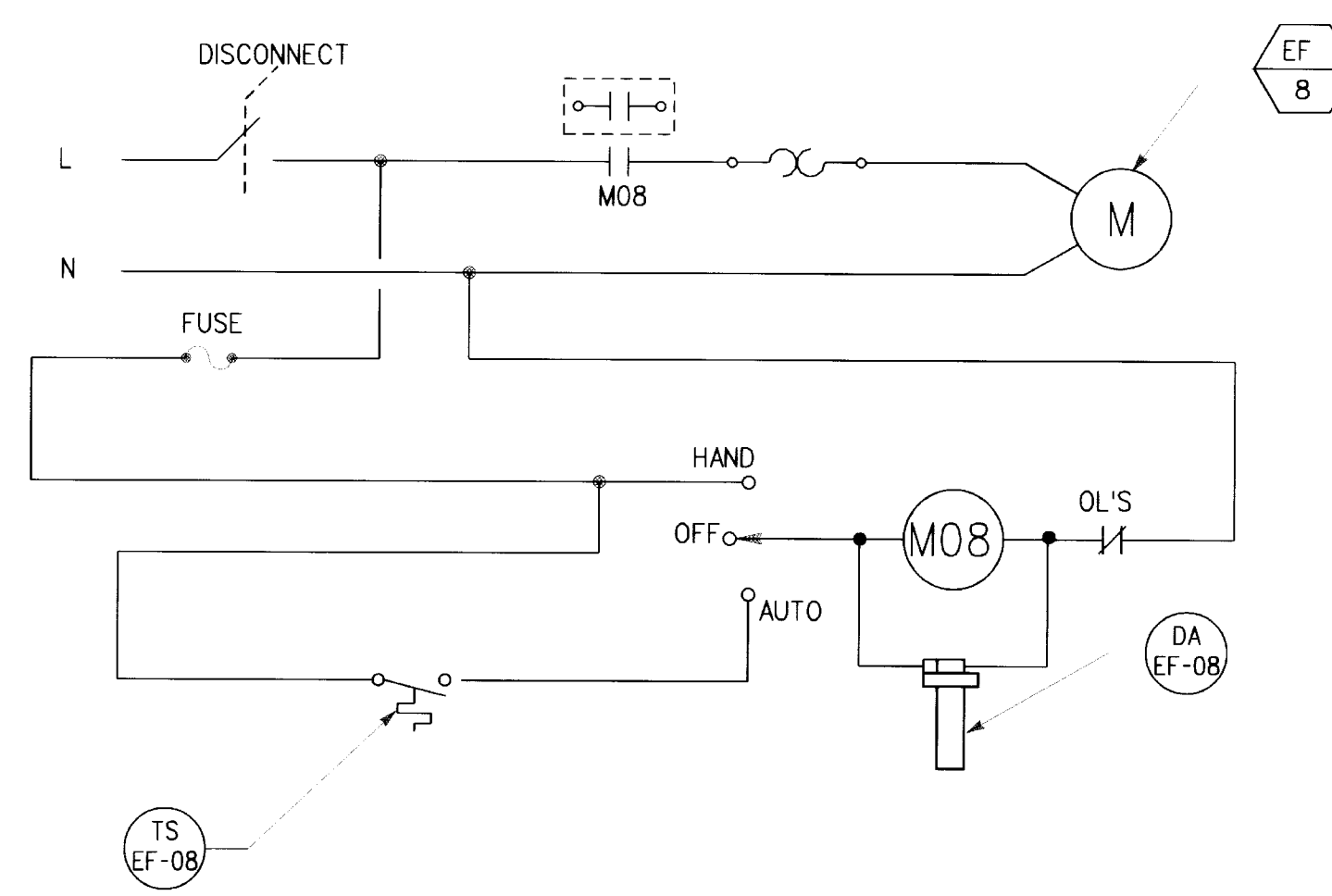
UNOCCUPIED MODE OVERRIDE SWITCH

CLOSING HS-07-01 SHALL PLACE THE DDC PANEL IN OCCUPIED MODE FOR ALL SYSTEMS. WHEN HS-07-01 IS OPEN OCCUPIED/UNOCCUPIED MODE SHALL BE DETERMINED BY THE SCHEDULES PROGRAMMED INTO THE DDC PANEL.



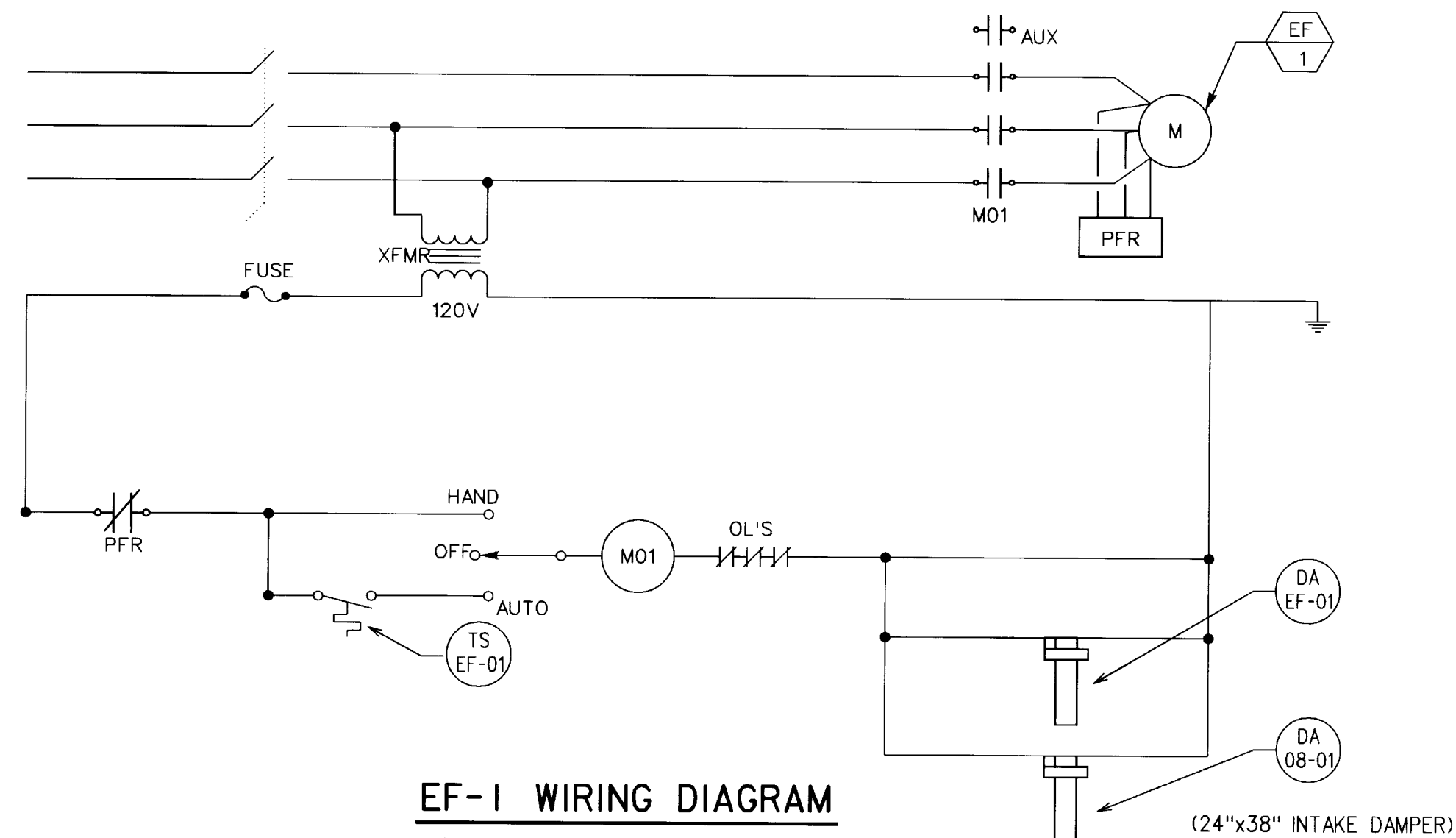
EF-7 WIRING DIAGRAM

NO SCALE



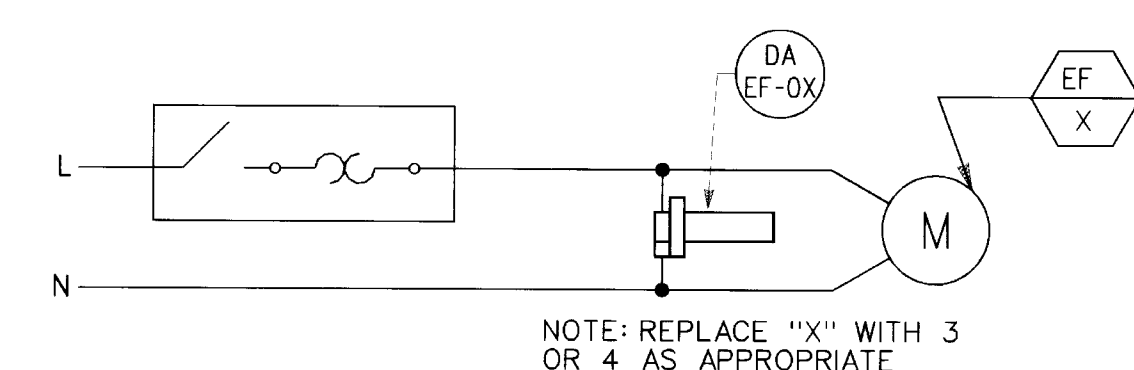
EF-8 WIRING DIAGRAM

NO SCALE



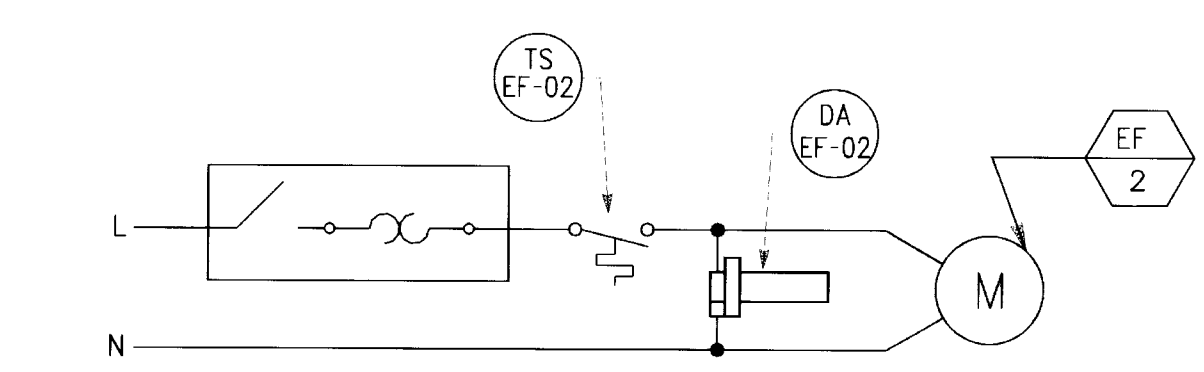
EF-1 WIRING DIAGRAM

NO SCALE



EF-3 AND EF-4 WIRING DIAGRAM

NO SCALE



EF-2 WIRING DIAGRAM

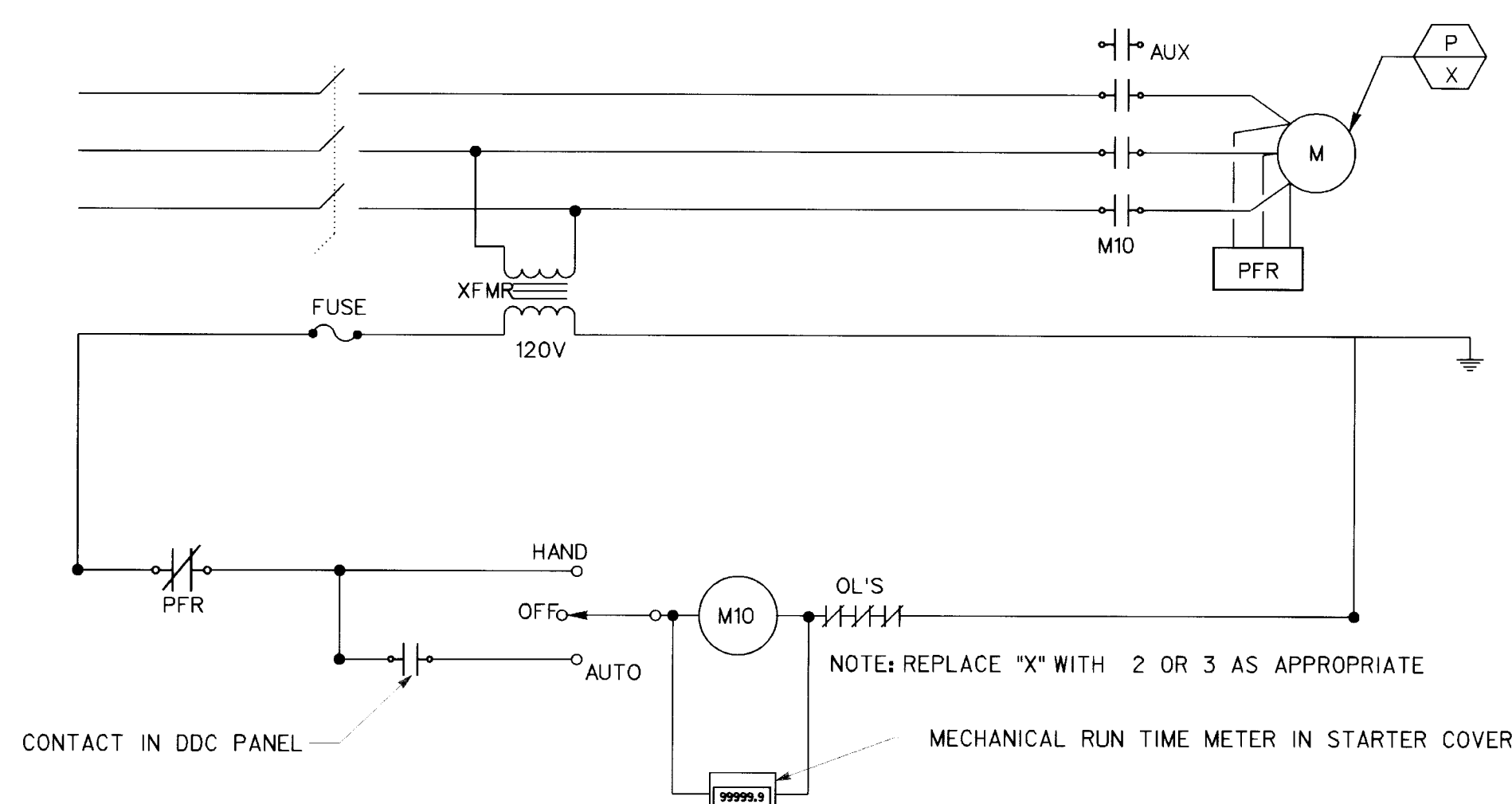
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AS-BUILT DRAWINGS

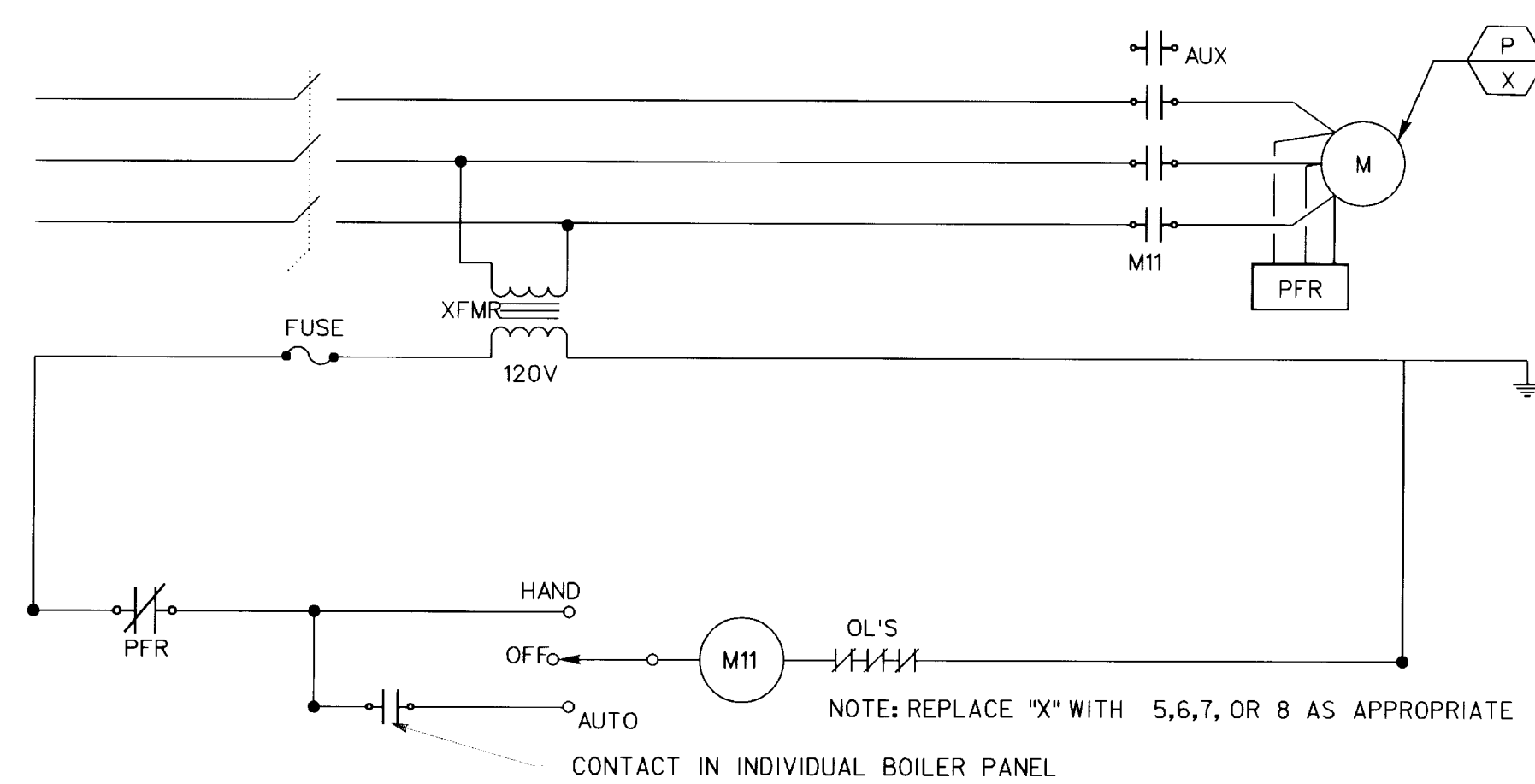
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Revisions			
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Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	MISCELLANEOUS CONTROL SCHEMATICS	
Checked by:	JBT	Scale: AS SHOWN	Sheet number: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G5011004.2D
		Dwg. No.: AF 141-753-01	File No.:

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HOT WATER PUMPS P-2 AND P-3 WIRING DIAGRAM



TYPICAL BOILER RECIRC PUMP INTERLOCK

HOT WATER CONTROL SYSTEM WIRING DIAGRAMS

HEATING SYSTEM SEQUENCE OF OPERATION

HYDRONIC HEATING SYSTEM CONTROL SEQUENCE OF OPERATION

HEATING MODE

HEATING MODE SHALL BE DETERMINED BASED ON THE OUTDOOR AIR TEMPERATURE. WHEN THE OUTDOOR AIR TEMPERATURE FALLS BELOW 58 DEGREES F, THE DDC SYSTEM SHALL PLACE THE SYSTEM IN HEATING MODE. WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 62 DEGREES F, THE HEATING SYSTEM SHALL BE OFF.

PRIMARY/BACKUP PUMP (P-2, P-3) CONTROL

WHEN THE DDC SYSTEM PLACES THE SYSTEM IN HEATING MODE, THE PRIMARY SYSTEM PUMP SHALL START AND OPERATE CONTINUOUSLY. WHENEVER THE CUMULATIVE RUN-TIME OF THE PRIMARY PUMP EXCEEDS THE CUMULATIVE RUN-TIME OF THE BACKUP PUMP BY 168 HOURS, THE PRIMARY AND BACKUP PUMPS SHALL ALTERNATE FUNCTION, WITH THE PRIMARY PUMP BECOMING THE BACKUP, AND THE BACKUP PUMP BECOMING THE PRIMARY. DURING SWITCHOVER, A TIME DELAY OF 30 SECONDS SHALL BE PROVIDED BETWEEN STOPPING AND RESTARTING OF THE PUMPS.

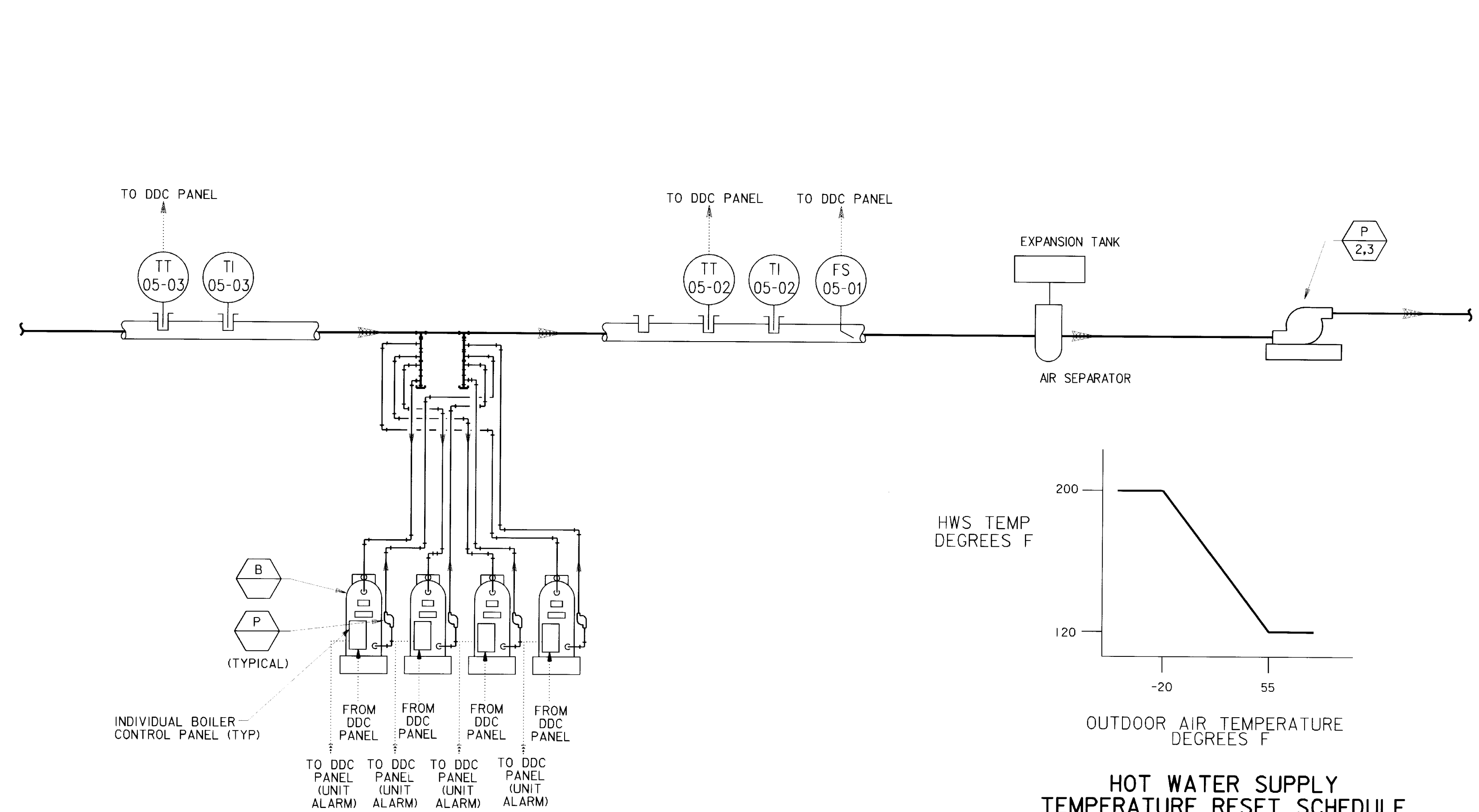
A FLOW SWITCH IN THE SYSTEM MAIN SHALL PROVE SYSTEM FLOW. IF THE SYSTEM IS PLACED IN HEATING MODE AND FLOW CANNOT BE PROVED, THE DDC SYSTEM SHALL SIGNAL A PUMP FAILURE ALARM, AND INITIATE PUMP PRIMARY/BACKUP SWITCHOVER. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT.

BOILER CONTROL (B-1 THROUGH B-4)

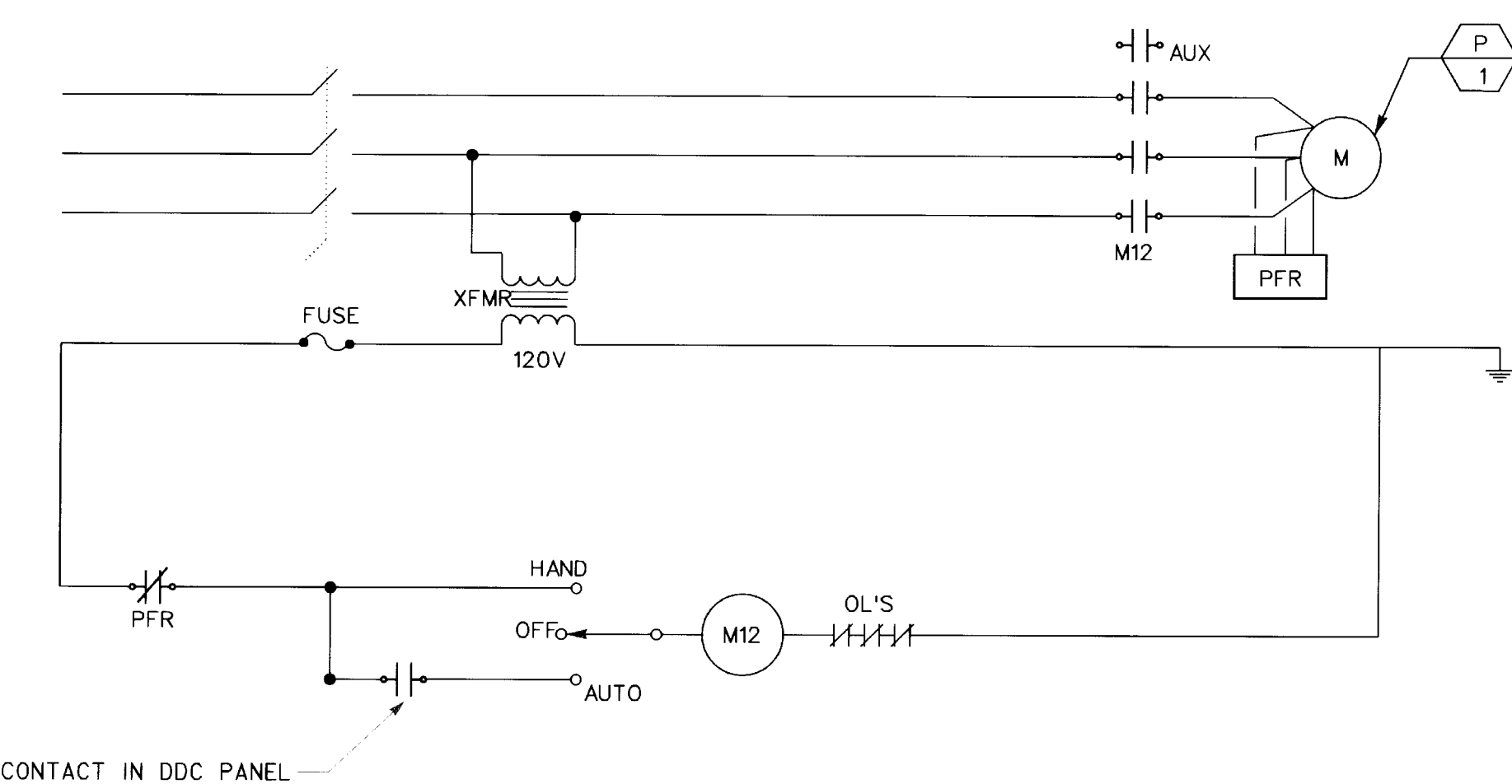
FLOW SHALL BE PROVEN IN THE SYSTEM MAIN PRIOR TO SEQUENCING OF BOILERS. ONCE FLOW IS PROVEN, THE DDC SYSTEM SHALL FIRE BOILERS IN SEQUENCE AND ENERGIZE INDIVIDUAL BOILER CIRCULATION PUMPS TO MAINTAIN THE HOT WATER SUPPLY TEMPERATURE IN ACCORDANCE WITH THE HOT WATER SUPPLY TEMPERATURE RESET SCHEDULE. IF A BOILER FAILS TO FIRE UPON REQUEST, THE DDC SYSTEM SHALL SIGNAL A BOILER FAILURE ALARM. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT.

BOILER CIRCULATION PUMP (P-5 THROUGH P-8) CONTROL

EACH BOILER CIRCULATION PUMP SHALL OPERATE WHENEVER ITS CORRESPONDING BOILER FIRES.



TYPICAL HOT WATER SYSTEM SCHEMATIC



CHILLED WATER PUMP STARTER DIAGRAM

COOLING SYSTEM SEQUENCE OF OPERATION

CHILLED WATER SYSTEM CONTROL SEQUENCE OF OPERATION

COOLING MODE

COOLING MODE SHALL BE DETERMINED BASED ON THE OUTDOOR AIR TEMPERATURE. WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 66 DEGREES F, THE DDC SYSTEM SHALL PLACE THE SYSTEM IN COOLING MODE. WHEN THE OUTDOOR AIR TEMPERATURE FALLS BELOW 62 DEGREES F, THE COOLING SYSTEM SHALL BE OFF.

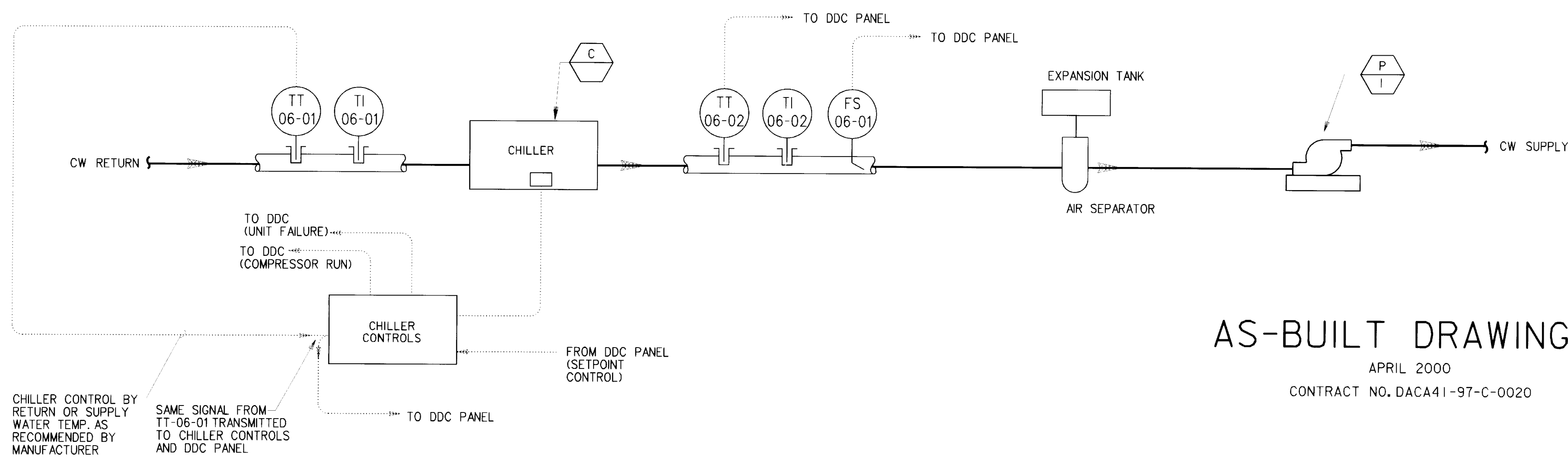
PUMP P-1 CONTROL

WHEN THE DDC SYSTEM PLACES THE SYSTEM IN COOLING MODE, THE SYSTEM PUMP SHALL START AND OPERATE CONTINUOUSLY.

A FLOW SWITCH IN THE SYSTEM MAIN SHALL PROVE SYSTEM FLOW. IF THE SYSTEM IS PLACED IN COOLING MODE AND FLOW CANNOT BE PROVED, THE DDC SYSTEM SHALL SIGNAL A PUMP FAILURE ALARM. THE DDC SYSTEM SHALL TIME-STAMP AND STORE THE EVENT.

CHILLER CONTROL

FLOW SHALL BE PROVEN IN THE SYSTEM MAIN PRIOR TO ENABLING THE CHILLER. ONCE FLOW IS PROVEN, THE DDC SYSTEM SHALL ENABLE THE CHILLER TO MAINTAIN 43 DEGREES SUPPLY WATER TEMPERATURE. IF THE CHILLER UNIT FAILS, OR A CHILLER COMPRESSOR FAILS, THE DDC SYSTEM SHALL SIGNAL A FAILURE ALARM. THE DDC SYSTEM SHALL TIME-STAMP AND STORE EACH EVENT.



TYPICAL CHILLED WATER SYSTEM SCHEMATIC

AS-BUILT DRAWINGS

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CONTRACT NO. DACA41-97-C-0020

Revisions			
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Drawn by:	JBT	HOT AND CHILLED WATER SYSTEM CONTROLS	
Checked by:	JBT	Scale:	AS SHOWN
Submitted by:	PEG	Date:	FEBRUARY 1997
		Sheet number:	TC-5
		Plot Scale:	8:1
		Design File:	g5011005.2D
		Dwg. No.:	AF 141-753-01
		File No.:	

631-000-156-129 TC-5

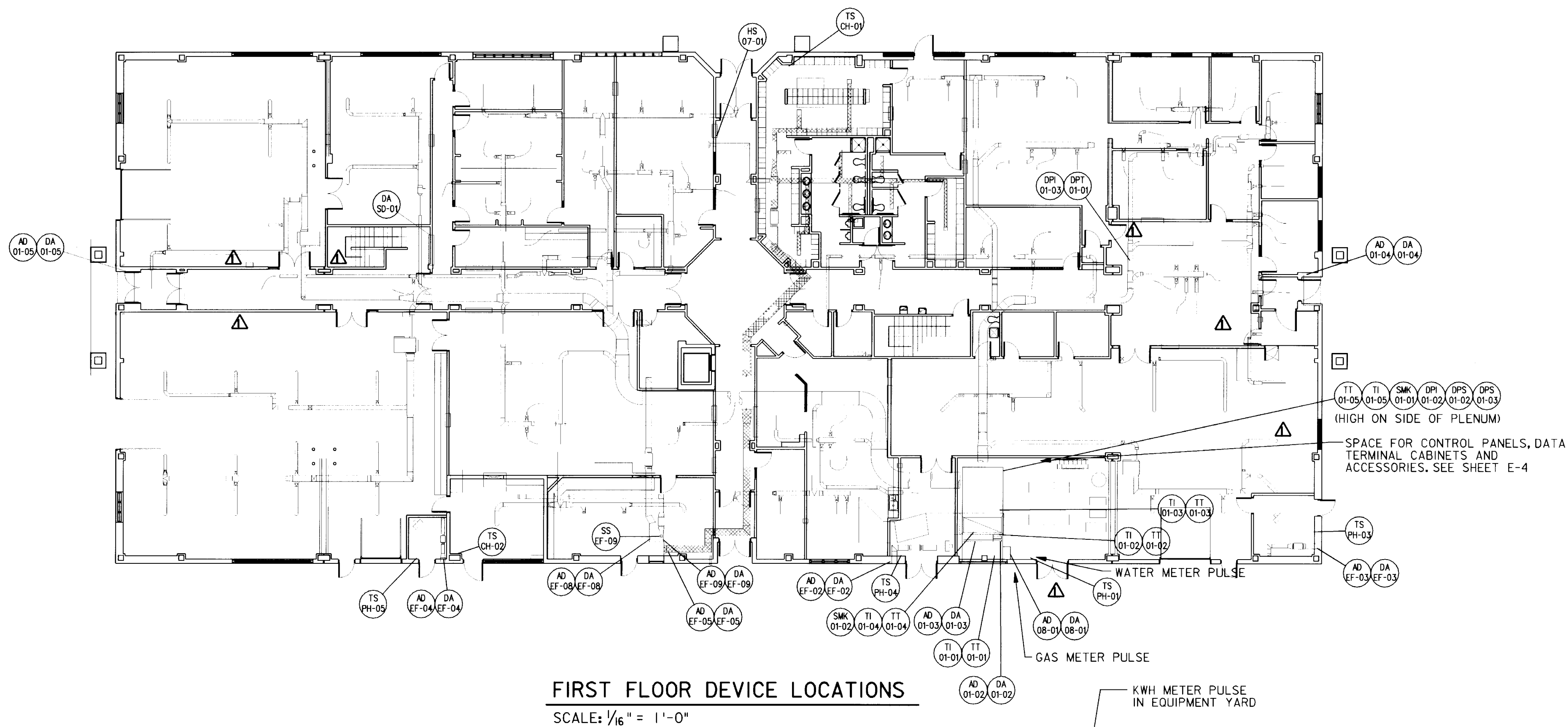
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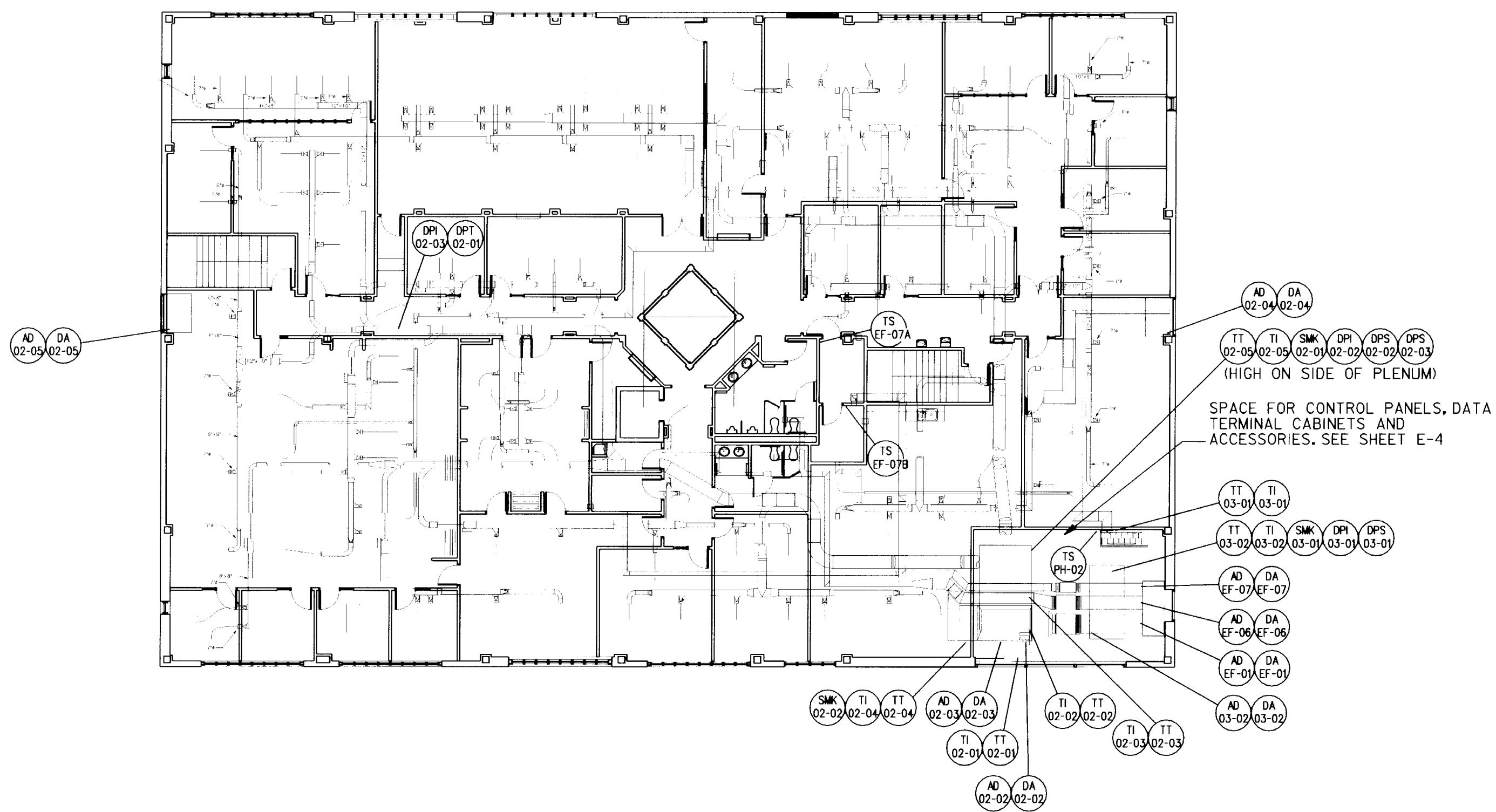
2

1



FIRST FLOOR DEVICE LOCATIONS

SCALE: 1/16" = 1'-0"



SECOND FLOOR DEVICE LOCATIONS

SCALE: 1/16" = 1'-0"

GENERAL NOTE

NOT ALL CONTROL DEVICES, SWITCHES, SENSORS AND COMPONENTS ARE SHOWN HERE. REFER TO SHEETS TC-1 THROUGH TC-5 AND SPECIFICATION SECTION 15951 FOR ADDITIONAL REQUIREMENTS.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	TEMPERATURE DEVICE LOCATION PLAN	
Checked by:	JBT	Scale: AS SHOWN	Sheet number: TC-6
Submitted by:	PEG	Date: FEBRUARY 1997	Plot Scale: 1/6" = 1'-0"
		Dwg. No.: AF 141-753-01	Design File: G5011006.3D
			File No.:

631-00- 156-130 TC-6

VALUE ENGINEERING PAYS

GENERAL NOTES

1. REFER TO PLUMBING RISERS FOR PIPING IN CHASES.
2. CONTRACTOR SHALL COORDINATE ALL PIPING BELOW THE SLAB WITH STRUCTURAL FOUNDATIONS.
3. WHERE A PIPE SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE PIPE SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED.
4. REFER TO STRUCTURAL DRAWINGS FOR PENETRATIONS THROUGH GRADE BEAMS.

PLUMBING FIXTURE SCHEDULE					
MARK	DESCRIPTION	MIN INDIVIDUAL CONNECTIONS (IN)			
		WASTE	VENT	CW	HW
P-1	WATER CLOSET	4"	2"	1 1/4"	
P-1A	WATER CLOSET HANDICAPPED	4"	2"	1 1/4"	
P-2	URINAL	2"	1 1/2"	1"	
P-2A	URINAL	2"	1 1/2"	1"	
P-3	LAVATORY	1 1/4"	1 1/4"	1/2"	1/2"
P-3A	WHEELCHAIR LAVATORY	1 1/4"	1 1/4"	1/2"	1/2"
P-4	KITCHEN SINK	1 1/2"	1 1/4"	1/2"	1/2"
P-5	SERVICE SINK, FLOOR MOUNT	2"	1 1/2"	1/2"	1/2"
P-6	SHOWER	2"	1 1/2"	1/2"	1/2"
P-7	ELECTRIC WATER COOLER	1 1/4"	1 1/4"	1/2"	
P-7A	EW HANDICAPPED	1 1/4"	1 1/4"	1/2"	
P-8	EMERGENCY EYEWASH/SHOWER			1 1/4"	
P-9	MAINTENANCE SINK	2"	1 1/2"	1/2"	1/2"
WMH	WASHING MACHINE HOOK-UP	2"	1 1/2"	1/2"	1/2"
FD	FLOOR DRAIN	VARIES	VARIES		

AS-BUILT DRAWINGS

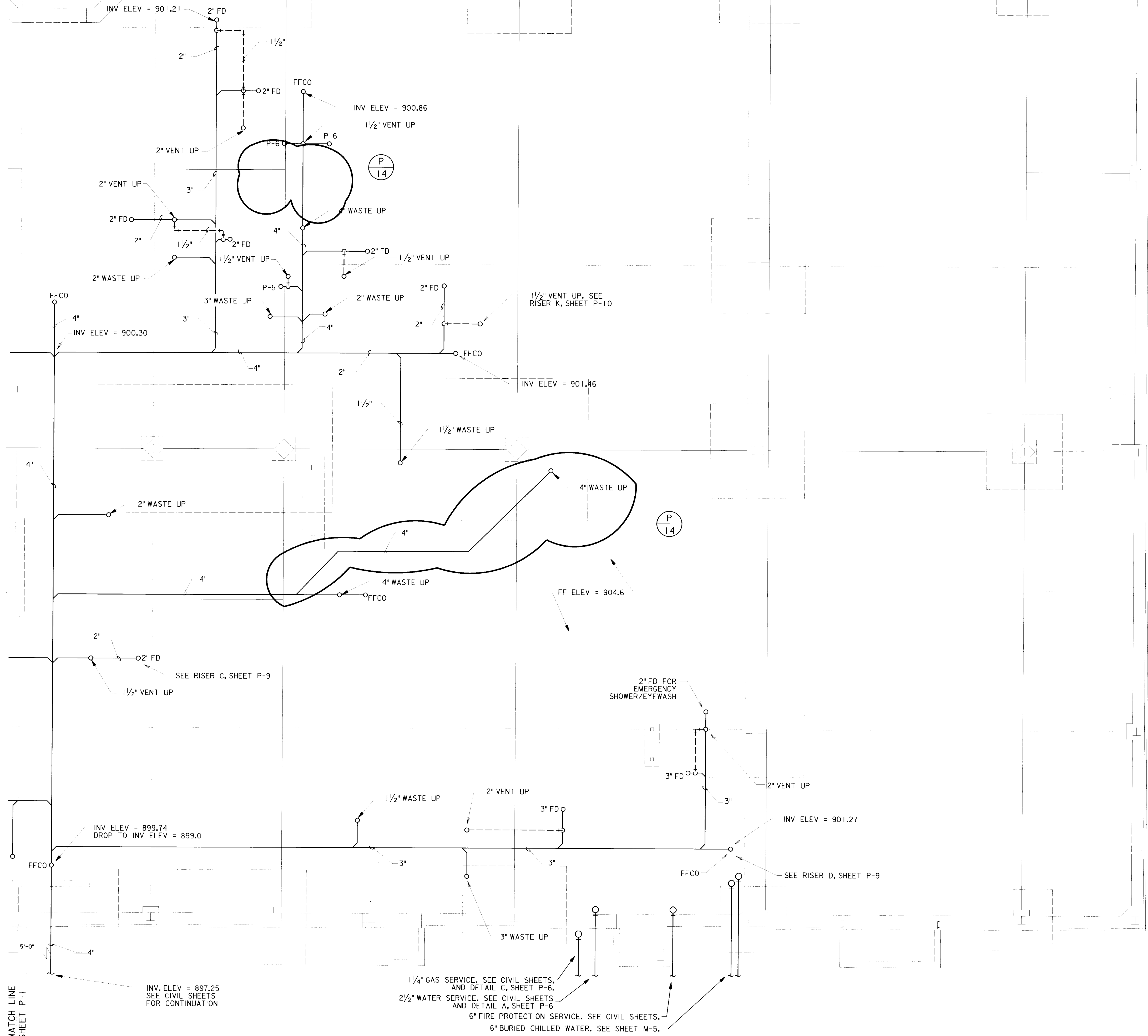
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	FOUNDATION PLUMBING PLAN	
Checked by:	JBT	Scale: 3/16" = 1'	Sheet number: 16:3
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501P001.3D
		Dwg. No.: AF 141-753-01	File No.:

FOUNDATION PLUMBING PLAN
SCALE: 3/16" = 1'-0"

KEY PLAN - FOUNDATION

MATCH LINE
SHEET P-1



MATCH LINE
SHEET P-1

FOUNDATION PLUMBING PLAN
SCALE: 3/16" = 1'-0"



GENERAL NOTES

1. REFER TO PLUMBING RISERS FOR PIPING IN CHASES.
2. CONTRACTOR SHALL COORDINATE ALL PIPING BELOW THE SLAB WITH STRUCTURAL FOUNDATIONS.
3. WHERE A PIPE SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE PIPE SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED.
4. REFER TO STRUCTURAL DRAWINGS FOR PENETRATIONS THROUGH GRADE BEAMS.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	US Army Corps of Engineers	
Checked by:	JBT	FOUNDATION PLUMBING PLAN	
Submitted by:	PEG	Scale: 3/16" = 1'	Sheet number: P-2
		Date: FEBRUARY 1997	Plot Scale: 1/6:3
		Dwg. No.: AF 141-753-01	Design File: G501P002.3D
			File No.:

631-000- 156-132 P-2

VALUE ENGINEERING PAYS

GENERAL NOTES

1. REFER TO PLUMBING RISERS FOR PIPING IN CHASES.
2. CONTRACTOR SHALL COORDINATE ALL PIPING BELOW THE SLAB WITH STRUCTURAL FOUNDATIONS.
3. WHERE A PIPE SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE PIPE SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED.
4. DOMESTIC WATER PIPE SIZES ARE BASED ON A MINIMUM WORKING PRESSURE OF 50 PSIG AT A FLOW RATE OF 2000 GPM FLOWING AT THE LOCATION WHERE THE MAIN SERVICE ENTERS THE BUILDING.
5. ROUTE PIPE THROUGH OPEN WEBS OF BAR JOISTS WHERE POSSIBLE TO AVOID CONFLICTS WITH DUCTWORK.

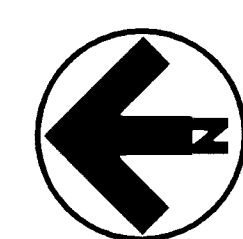
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	JBT	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	PIPING PLAN FIRST FLOOR	
Checked by:	JBT	Scale: $\frac{3}{16}" = 1'$	Sheet number: P-3 Plot Scale: 16:3
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501P003.3D
		Dwg. No.: AF 141-753-01	File No.:


FIRST FLOOR PIPING PLAN

SCALE: $\frac{3}{16}" = 1'-0"$

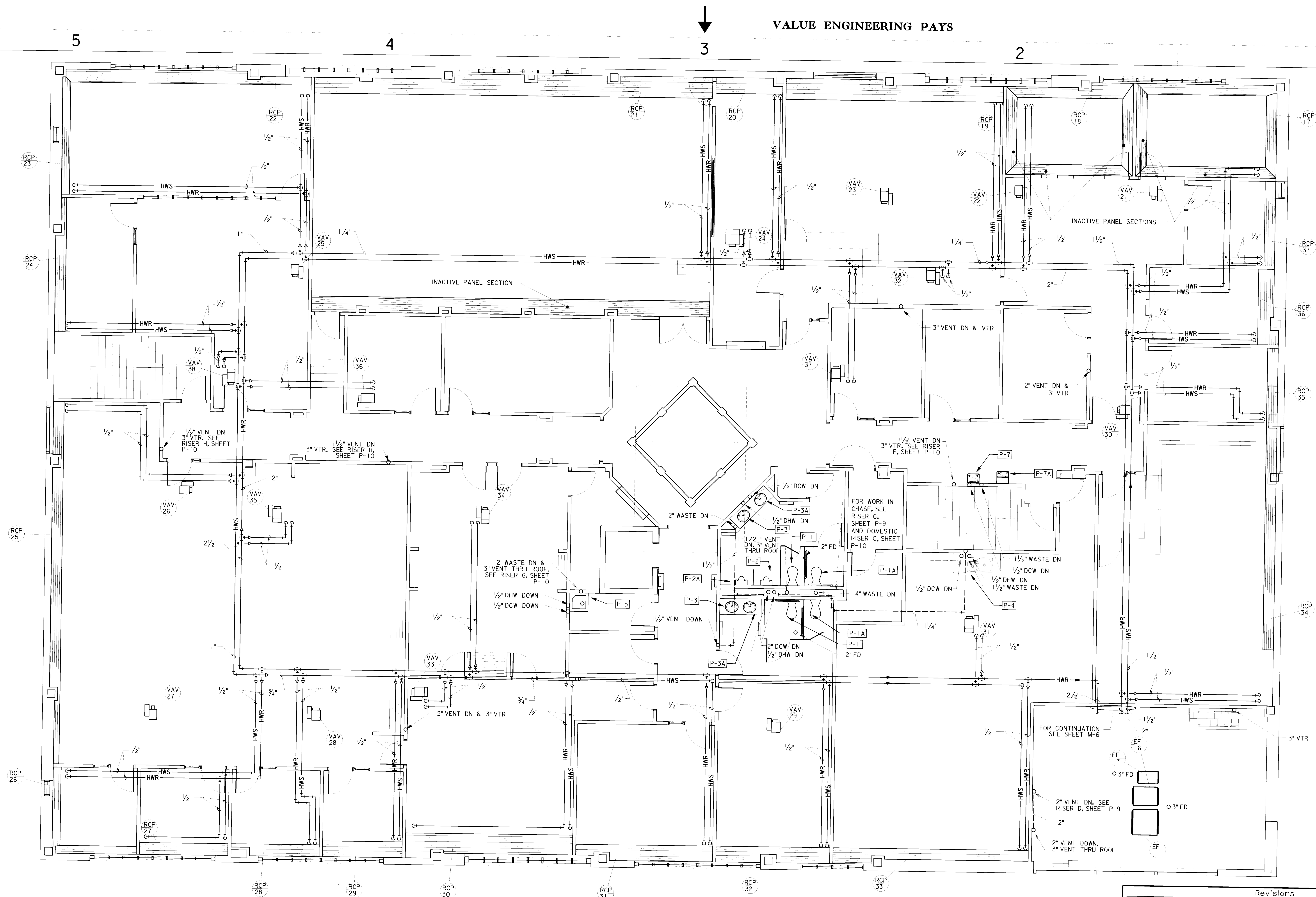


63-00- 156-133 P-3



Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p align="center">U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU	
JBT			
Drawn by:			
JBT	<p align="center">PIPING PLAN FIRST FLOOR</p>		
Checked by:			
JBT	Scale:	Sheet number:	Plot Scale: 1/6:3
Submitted by:	Date:	<p align="center">P-4</p>	Design File: 6501 P004.3D
PEG	FEBRUARY 1997 Dwg. No. AF 141-753-01		File No.

VALUE ENGINEERING PAYS

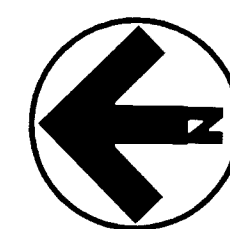


GENERAL NOTES

1. REFER TO PLUMBING RISERS FOR PIPING IN CHASES.
2. CONTRACTOR SHALL COORDINATE ALL PIPING BELOW THE SLAB WITH STRUCTURAL FOUNDATIONS.
3. WHERE A PIPE SIZE IS NOT SHOWN, THE LARGEST SIZE GIVEN ALONG THE PIPE SHALL BE THE SIZE INSTALLED UP TO THE POINT WHERE A NEW SMALLER SIZE IS INDICATED.
4. DOMESTIC WASTE PIPE SIZES ARE BASED ON A MINIMUM WORKING PRESSURE OF 55 PSIG AT A FLOW RATE OF 2000 GPM FLOWING AT THE LOCATION WHERE THE MAIN SERVICE ENTERS THE BUILDING.
5. ROUTE PIPING THROUGH OPEN WEB OF BAR JOISTS WHERE POSSIBLE TO AVOID CONFLICTS WITH DUCTWORK.

PIPING PLAN SECOND FLOOR

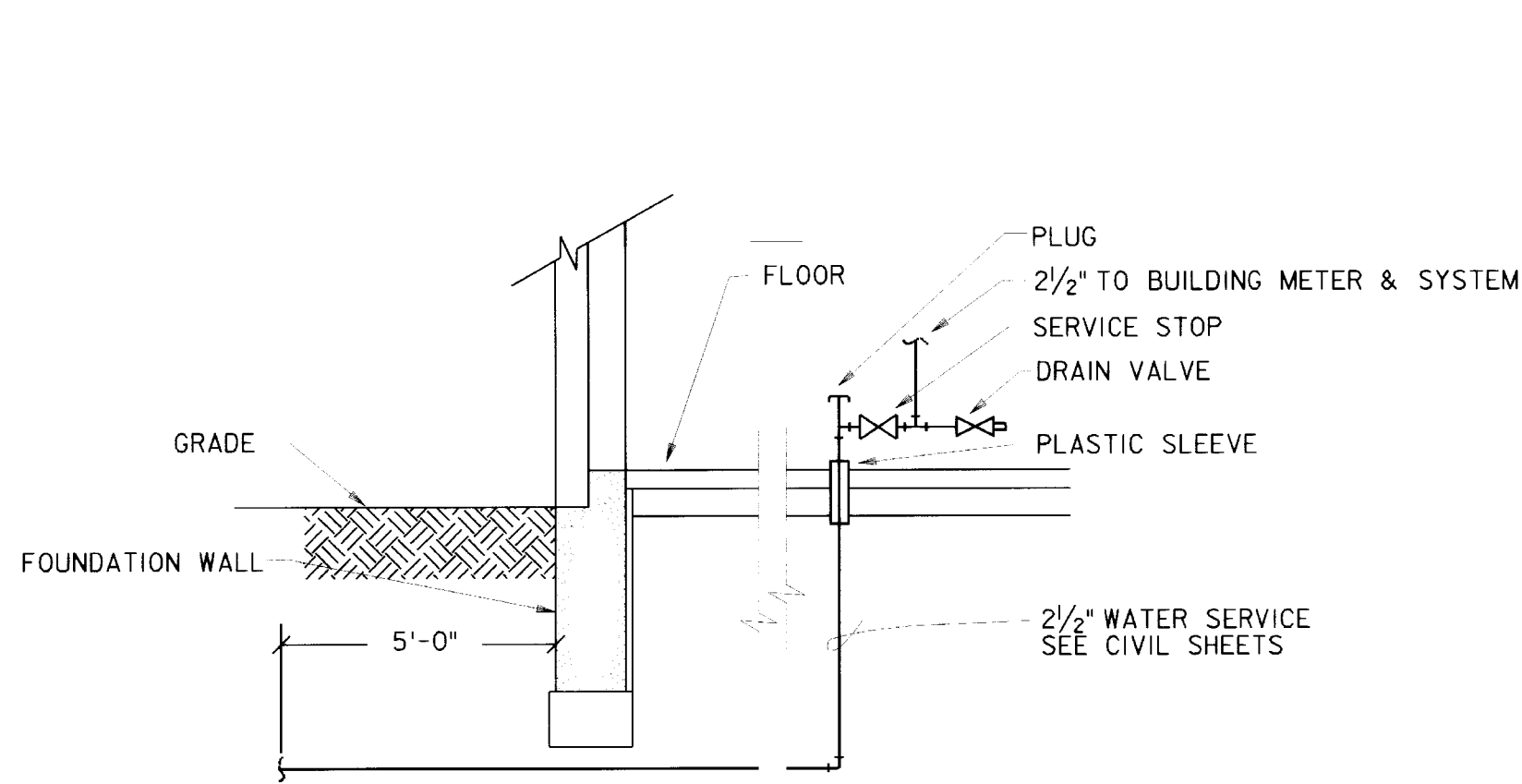
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AS-BUILT DRAWINGS

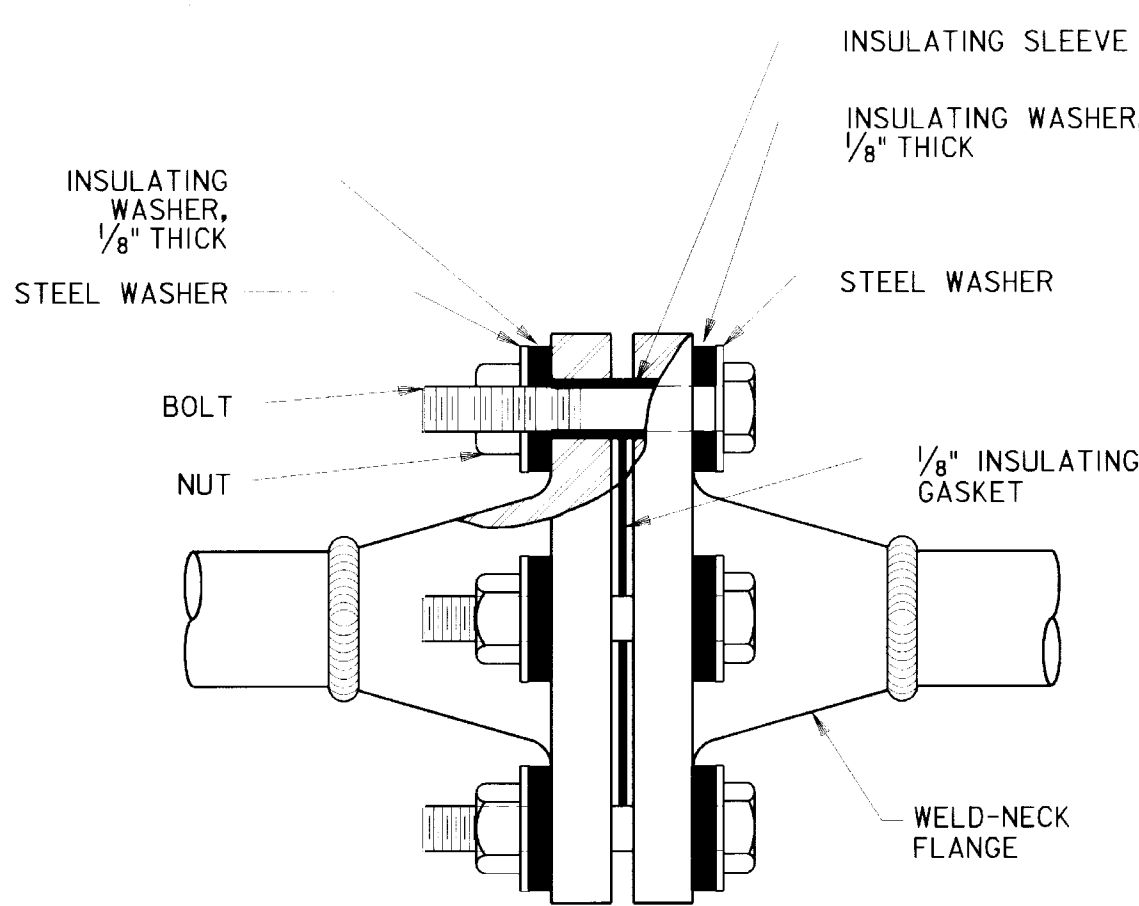
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CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 - FY97 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	PIPING PLAN SECOND FLOOR	
Checked by:	JBT	Scale: 3/16" = 1'	Sheet number: P-5 Plot Scale: 1/64"
Submitted by:	PEG	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	Design File: G501P005.3D File No.:



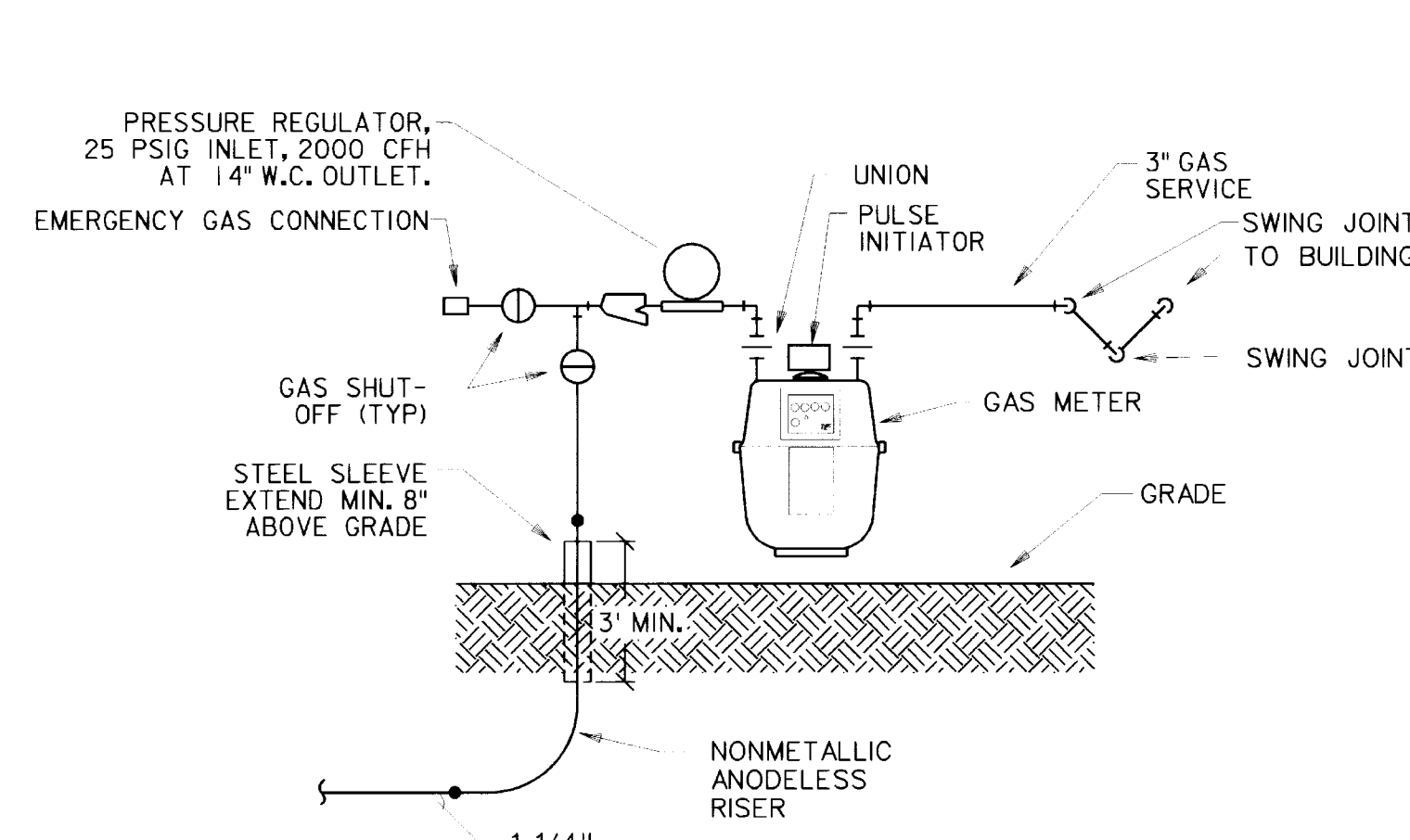
A WATER SERVICE ENTRANCE DETAIL

M5/P6 NOT TO SCALE



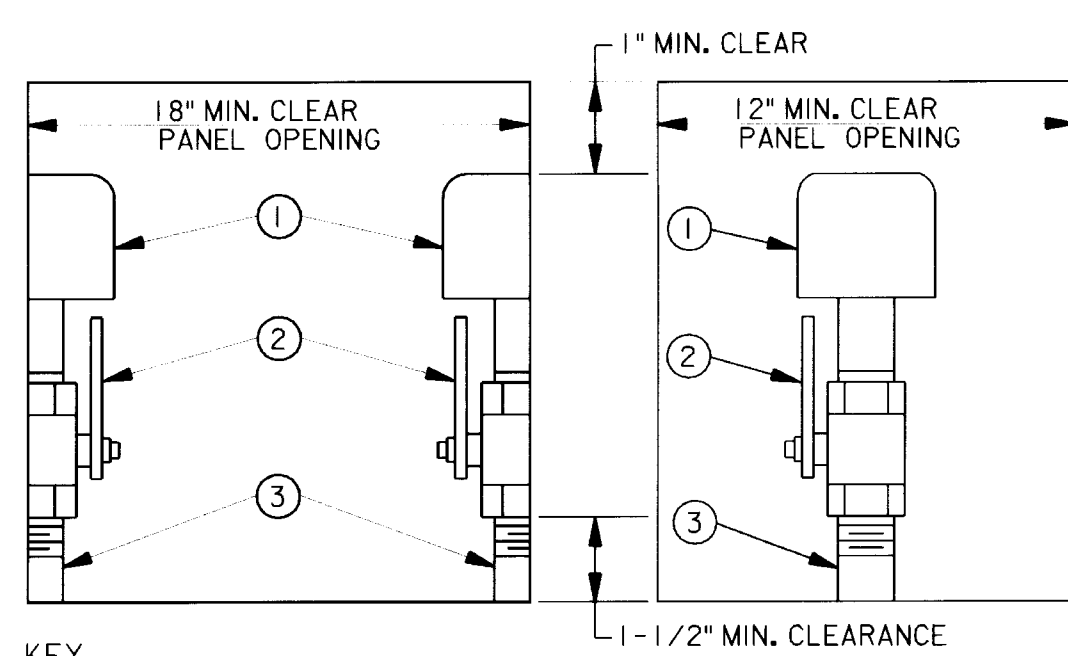
B DIELECTRIC FLANGED JOINT DETAIL

P7/P6 NOT TO SCALE



C GAS SERVICE ENTRANCE DETAIL

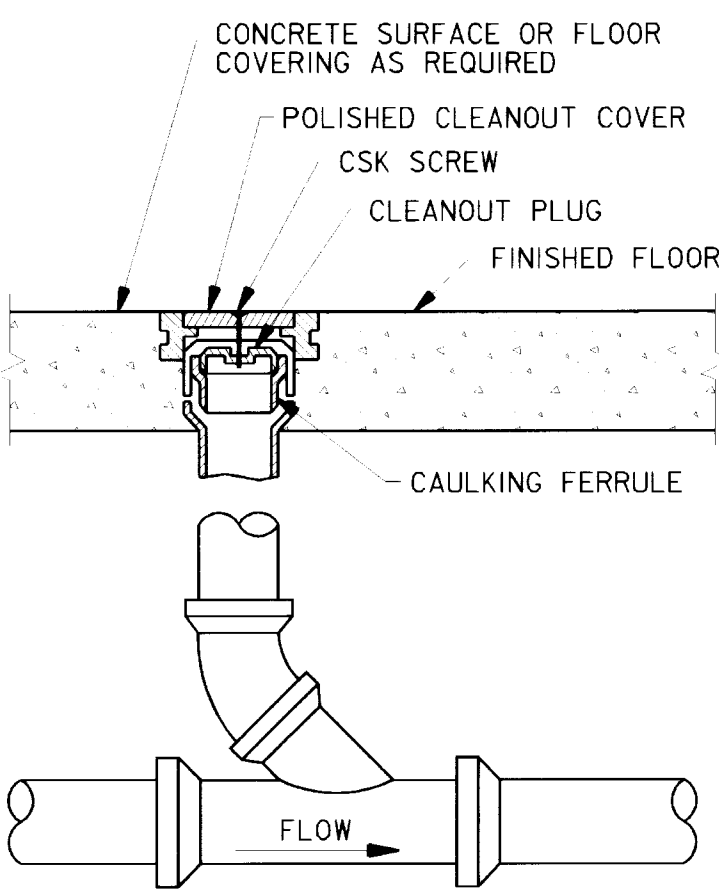
M5/P6 NOT TO SCALE



- KEY
- 1 WATER HAMMER ARRESTOR
 - 2 BALL VALVE, SAME NOMINAL SIZE AS PIPE BRANCH IN CHASE. OPENING IN BALL VALVE TO MATCH PIPE I.D.
 - 3 PIPE SAME SIZE AS BRANCH IN CHASE TO WHICH IT IS ATTACHED.
- NOTE: PROVIDE REDUCER IF REQUIRED BETWEEN VALVE AND WATER HAMMER ARRESTOR.

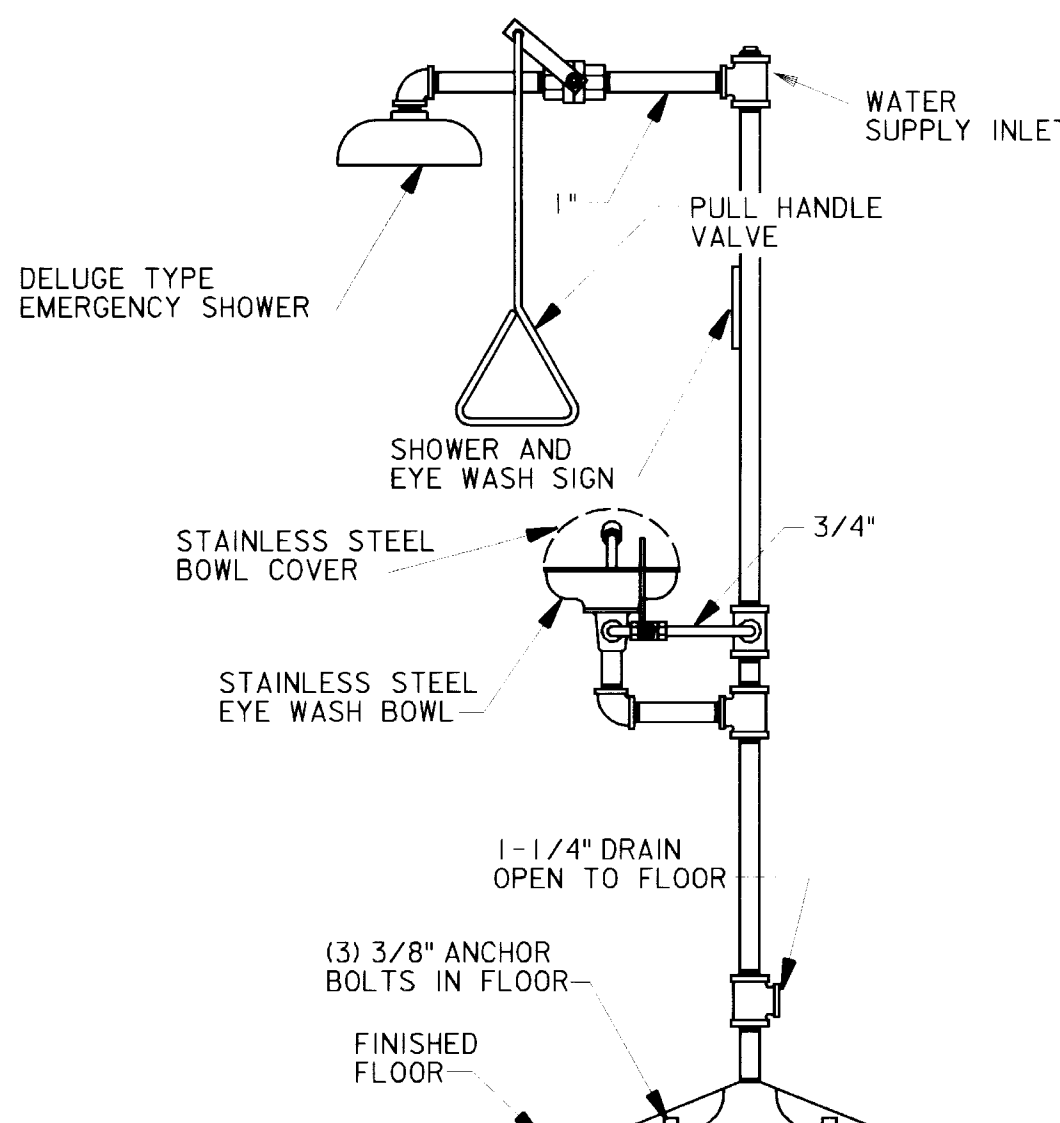
E TYPICAL WATER HAMMER ARRESTOR PANEL DETAIL (SINGLE AND DOUBLE)

GEN/P6 NOT TO SCALE



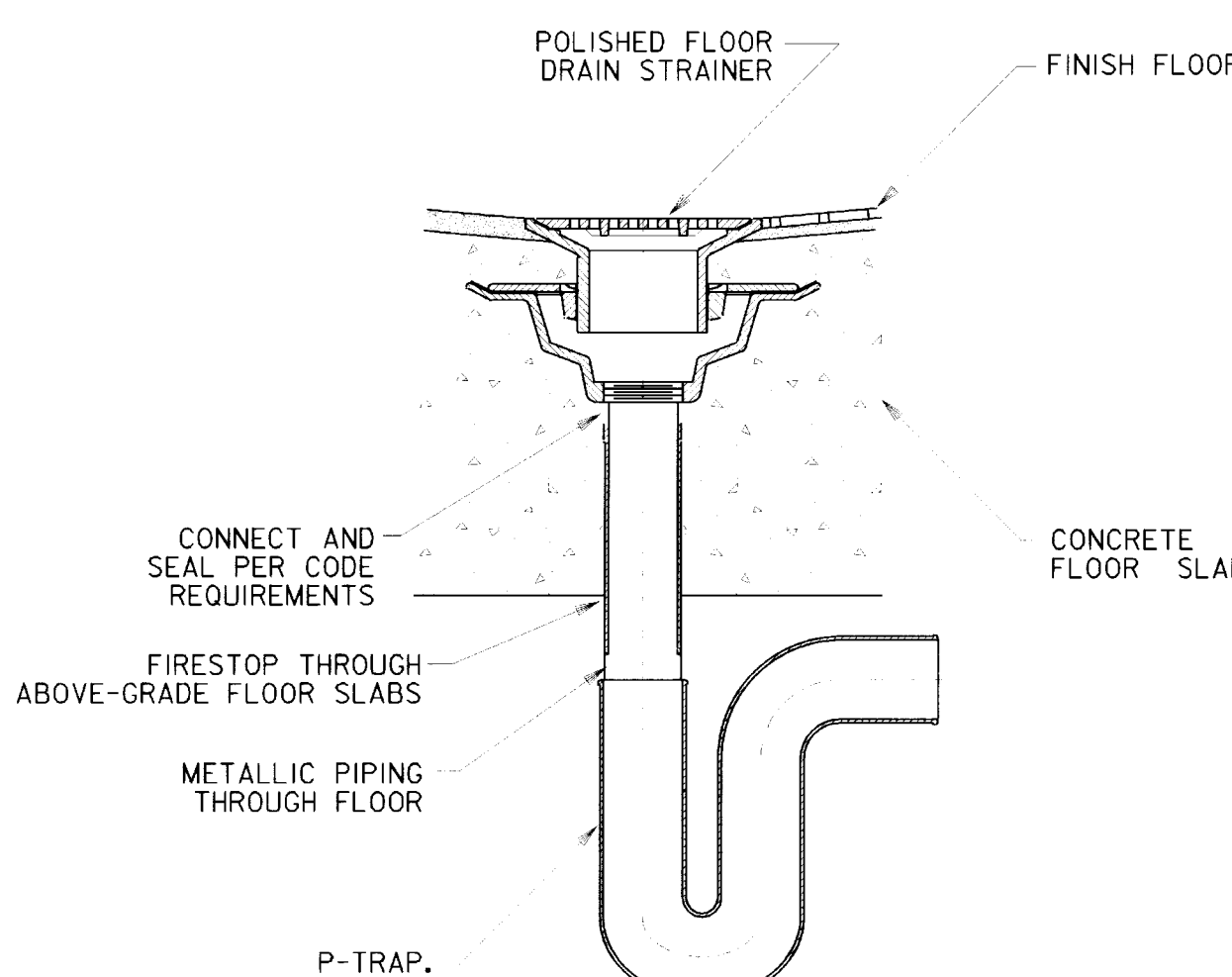
F TYPICAL FINISHED FLOOR CLEANOUT DETAIL

GEN/P6 NOT TO SCALE



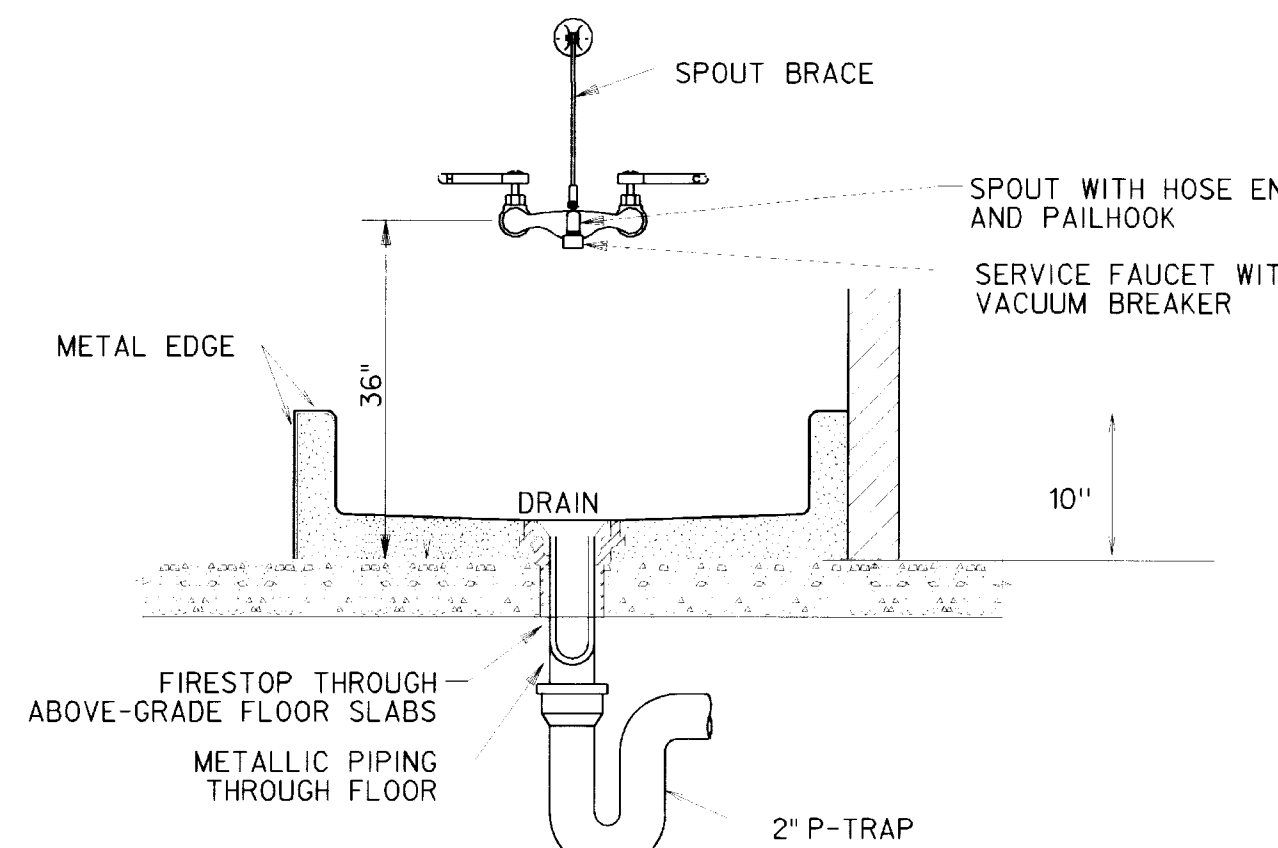
G EMERGENCY EYEWASH/SHOWER DETAIL

P3/P6 NOT TO SCALE



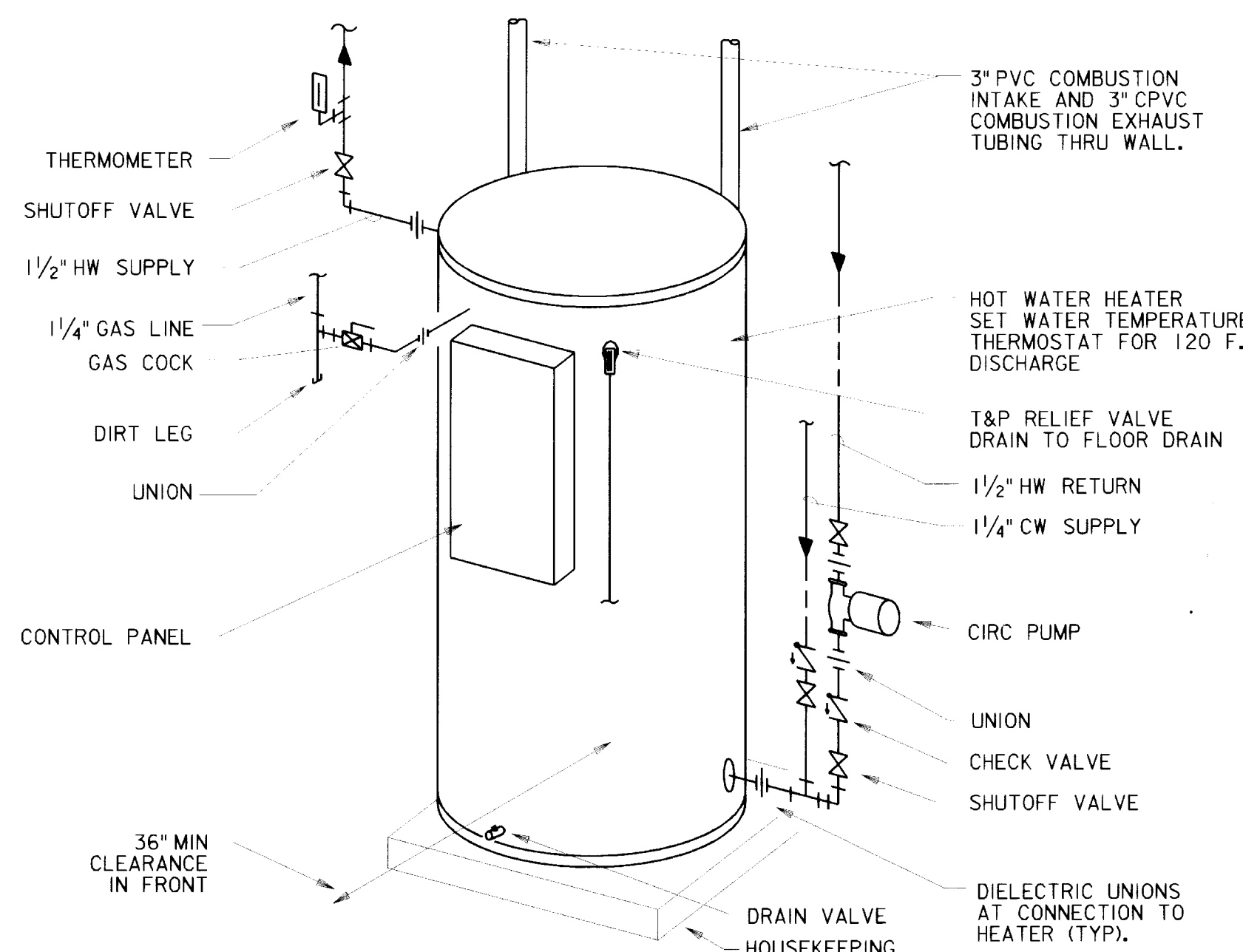
H FLOOR DRAIN DETAIL

GEN/P6 NOT TO SCALE



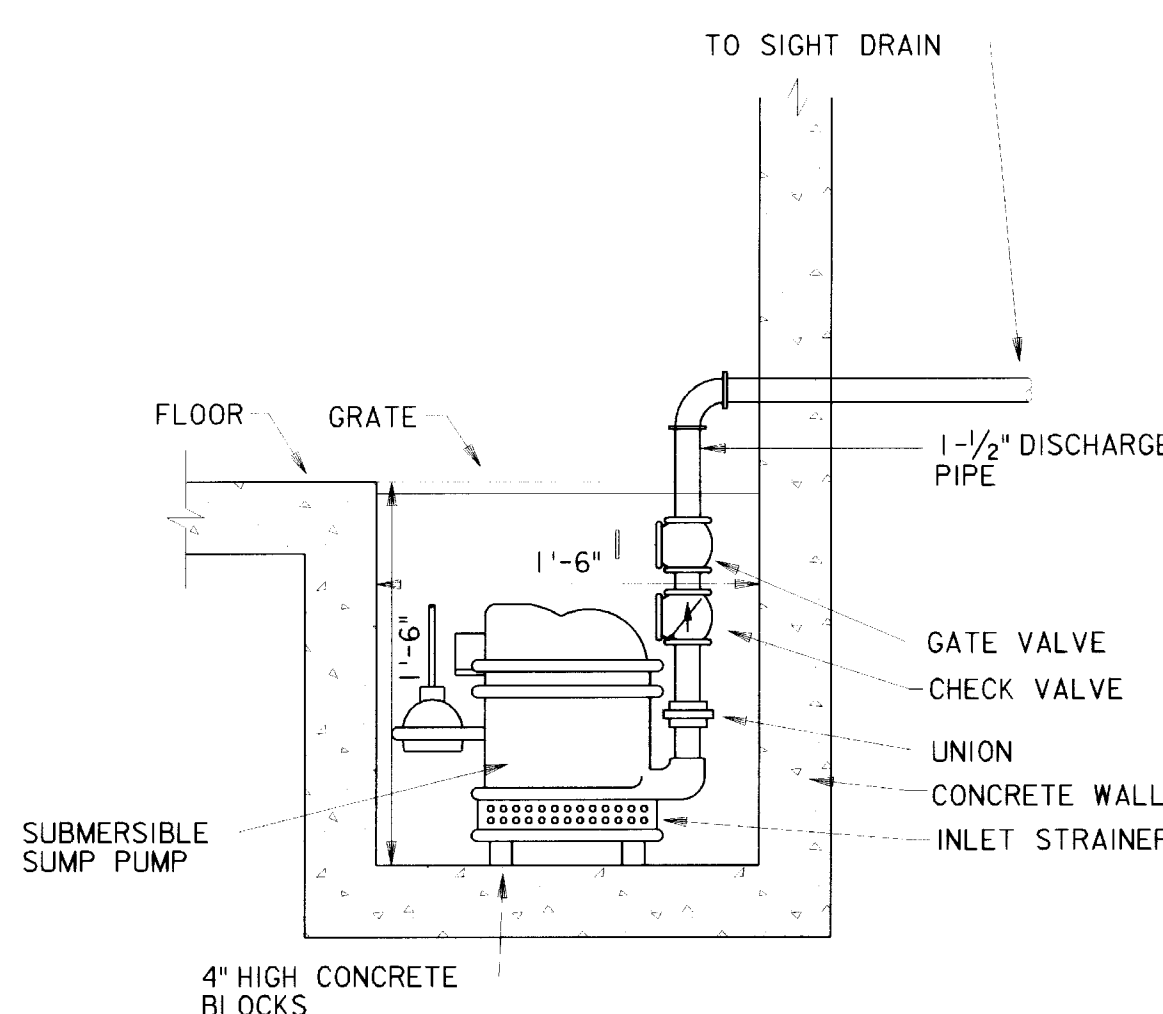
M SERVICE SINK DETAIL

P3/P6 NOT TO SCALE



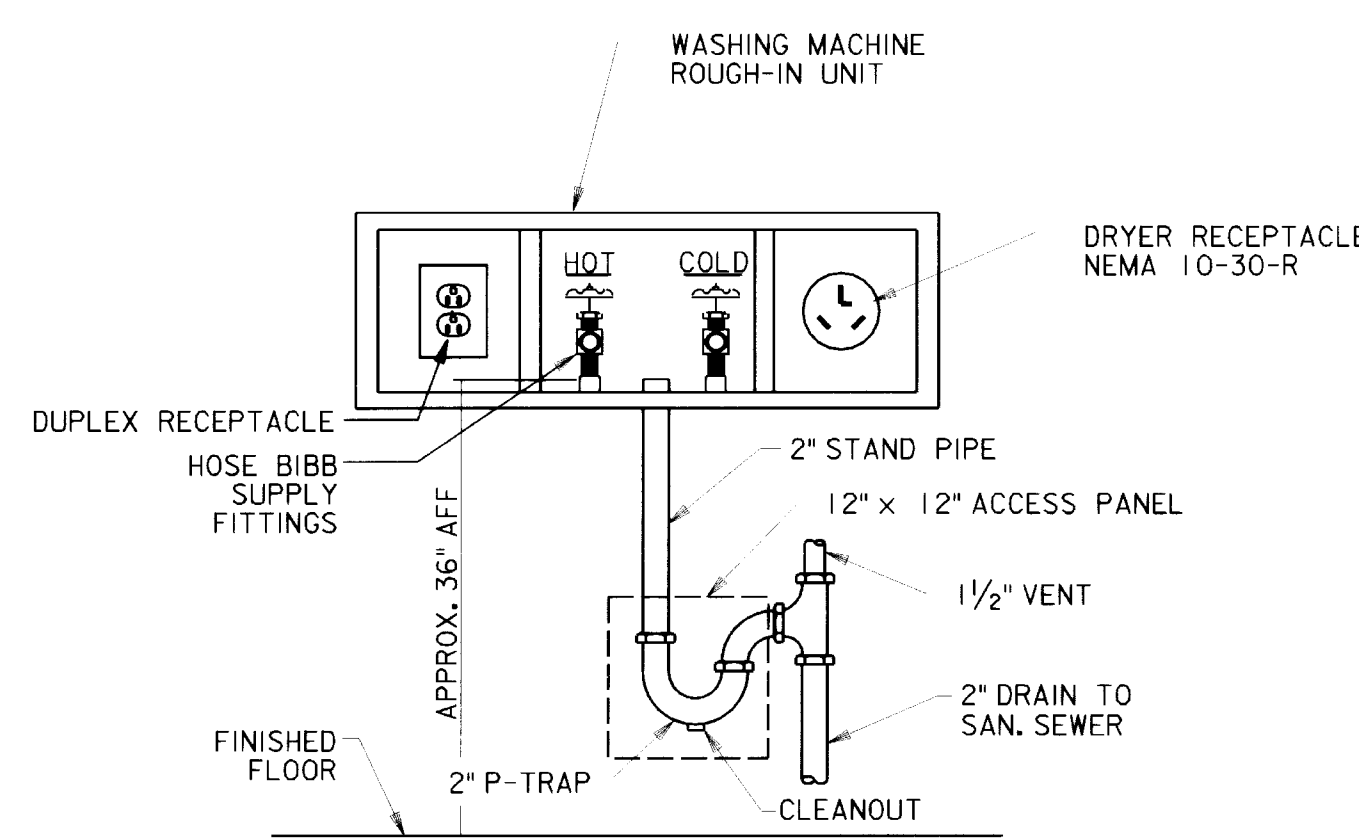
J GAS FIRED HOT WATER HEATER DETAIL

M5/P6 NOT TO SCALE



K SUMP PUMP DETAIL

P2/P6 NOT TO SCALE



L TYPICAL WASHING MACHINE HOOK-UP DETAIL

P4/P6 NOT TO SCALE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	Grand Forks AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 SQUADRON OPERATIONS/AMU
Drawn by:	JBT	PLUMBING DETAILS	
Checked by:	JBT	Scale: NO SCALE	Sheet number: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: 6501P006.2D
		Dwg. No.: AF 141-753-01	File No.:

631-000-

156-136

P-6



1

5

4

3

2

1

D

C

B

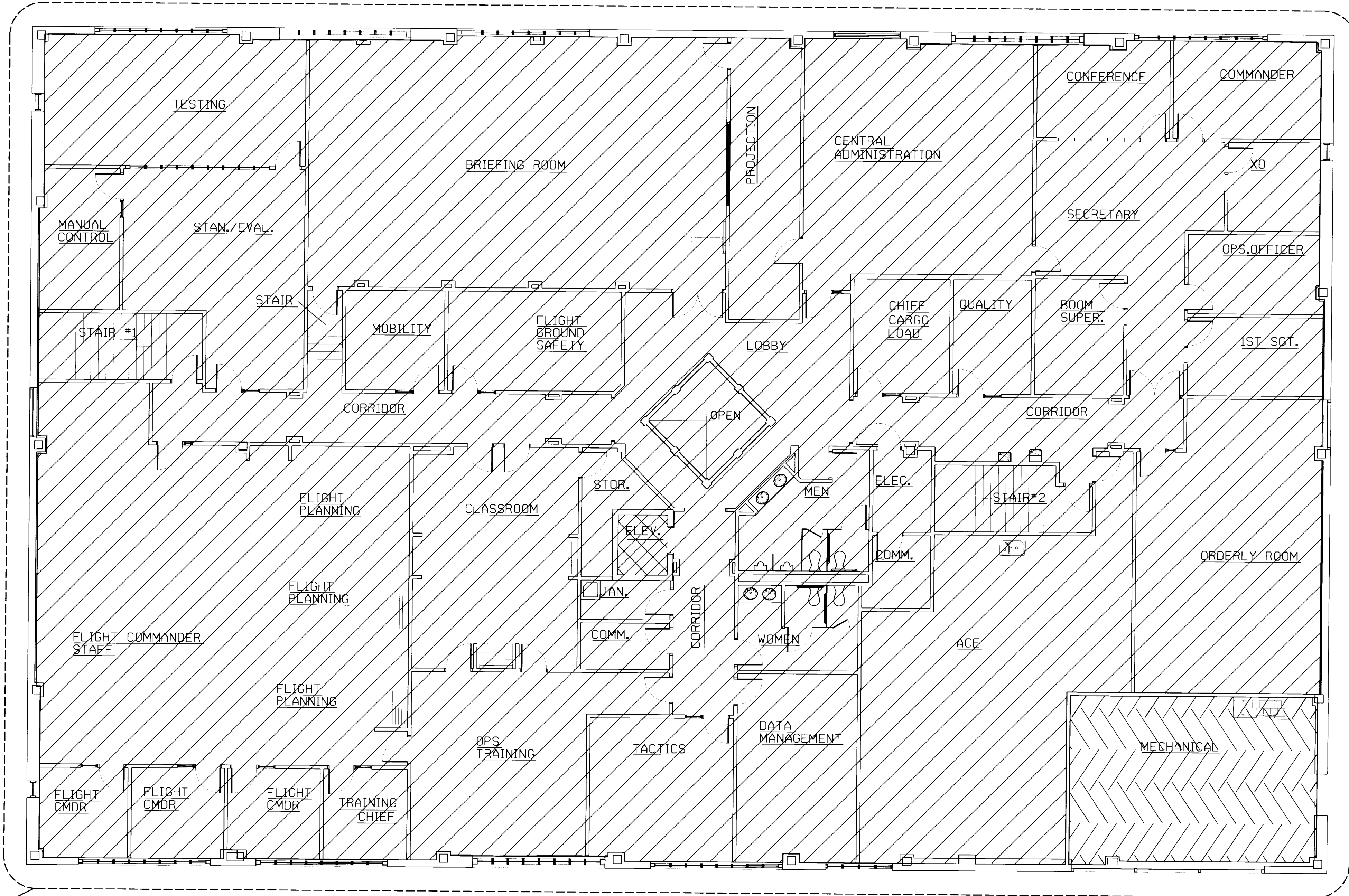
A

D

C

B

A



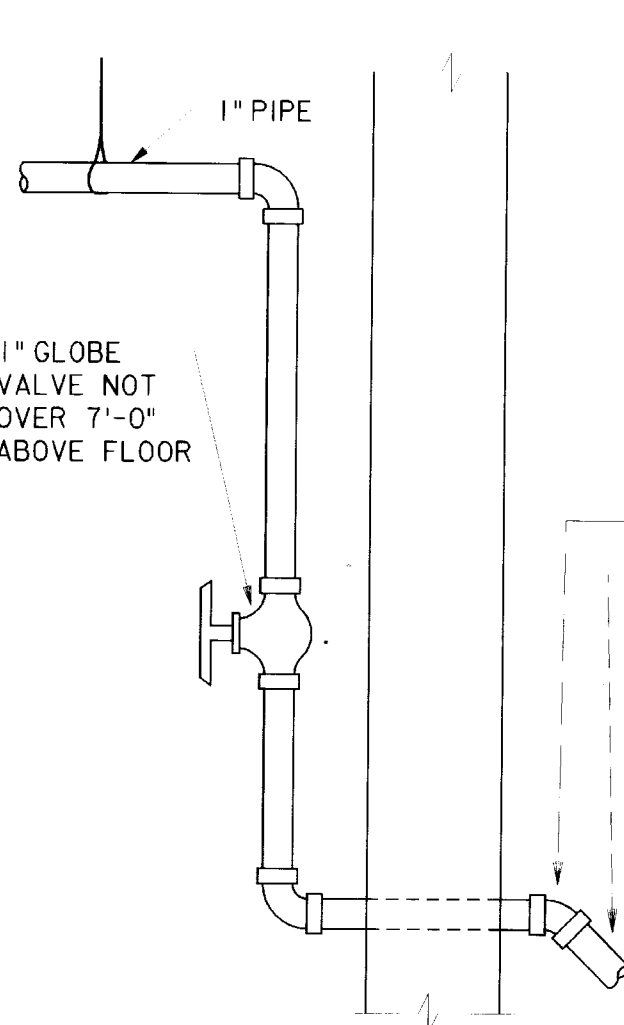
SPRINKLER ZONE 3

SECOND FLOOR FIRE PROTECTION PLAN

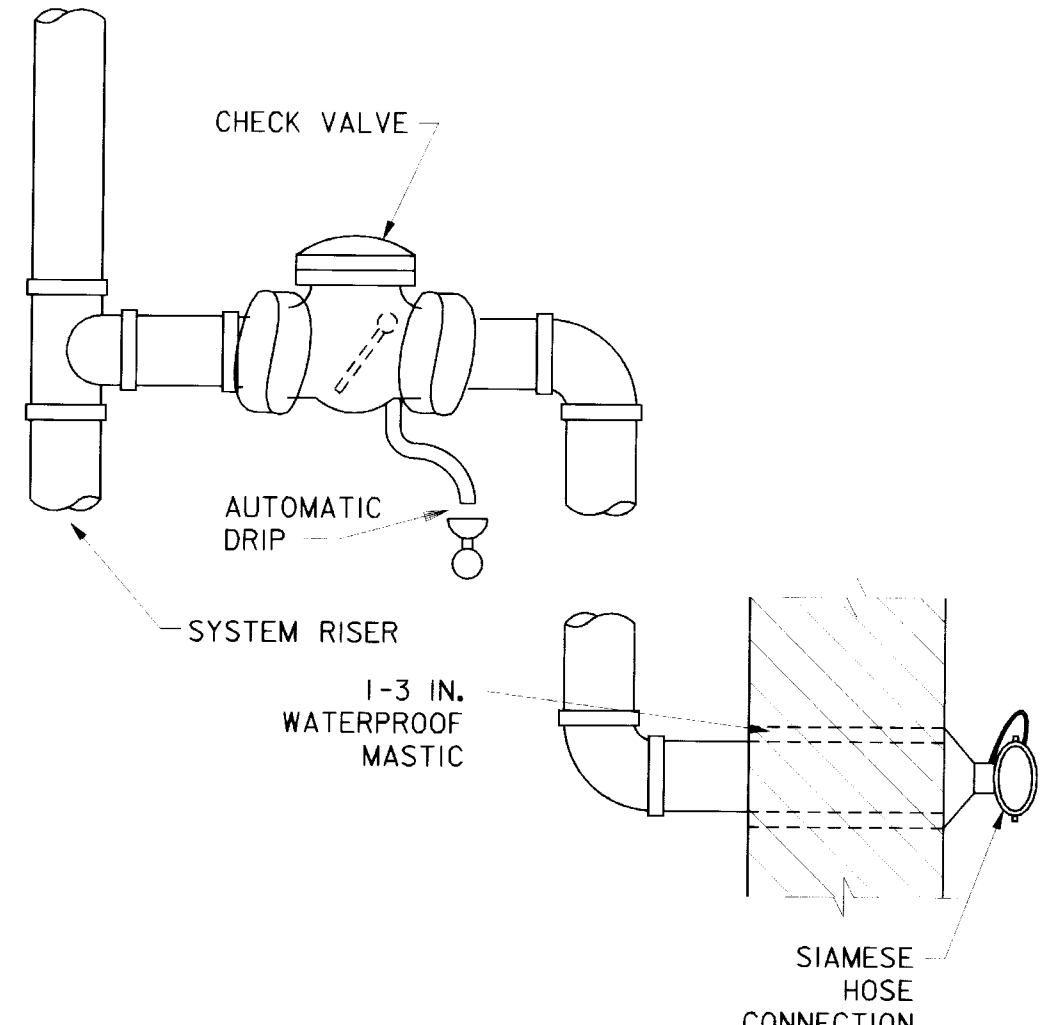
SCALE: 1/8" = 1'-0"

NOTES:
PROVIDE 1 ZONE CONTROL VALVE AND FLOW SWITCH PER SPRINKLER ZONE.

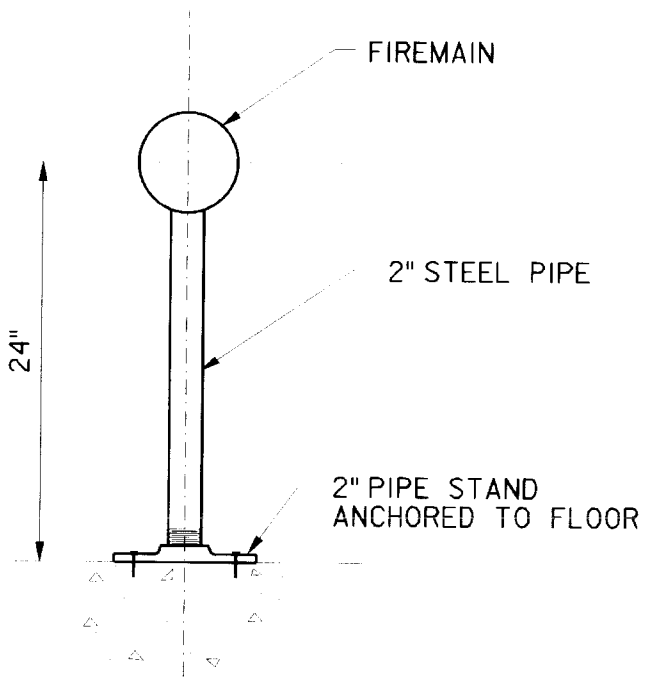
- ORDINARY HAZARD GRP 2
- LIGHT HAZARD
- ORDINARY HAZARD GRP 1



B INSPECTOR TEST DRAIN
P7/P8 NOT TO SCALE



C FIRE DEPARTMENT CONNECTION
P7/P8 NOT TO SCALE



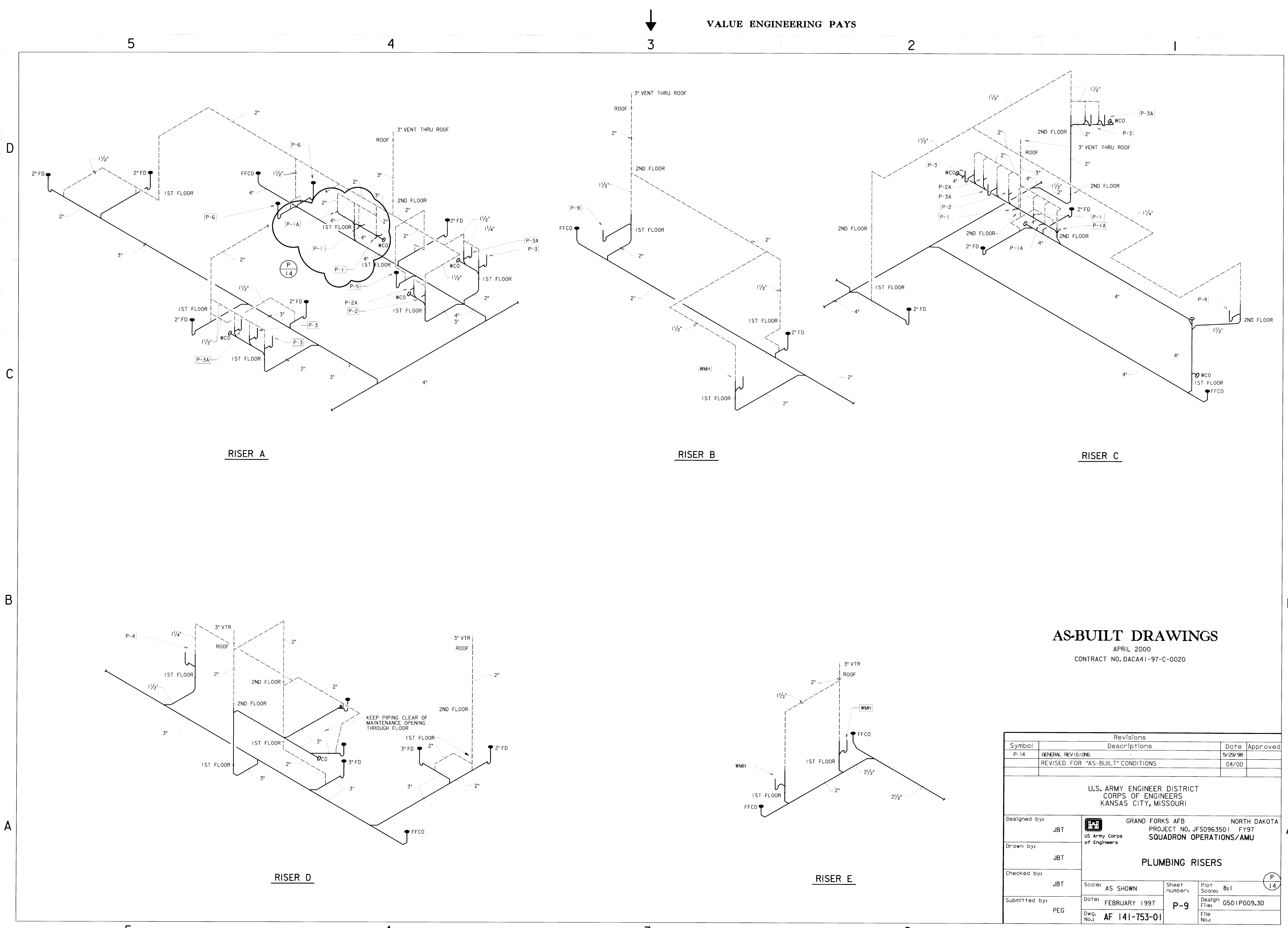
D PIPE STAND DETAIL
P7/P8 NOT TO SCALE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions				
Symbol	Descriptions	Date	Approved	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00		
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI				
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by:	JBT	SECOND FLOOR FIRE PROTECTION PLAN		
Checked by:	JBT			
Submitted by:	PEG	Scale: AS SHOWN	Sheet number: P-8	Plot Scale: 8:1
		Date: FEBRUARY 1997	Design File: C501P008.3D	File No.:
		Dwg. No.: AF 141-753-01		

631-000- 156-138 P-8

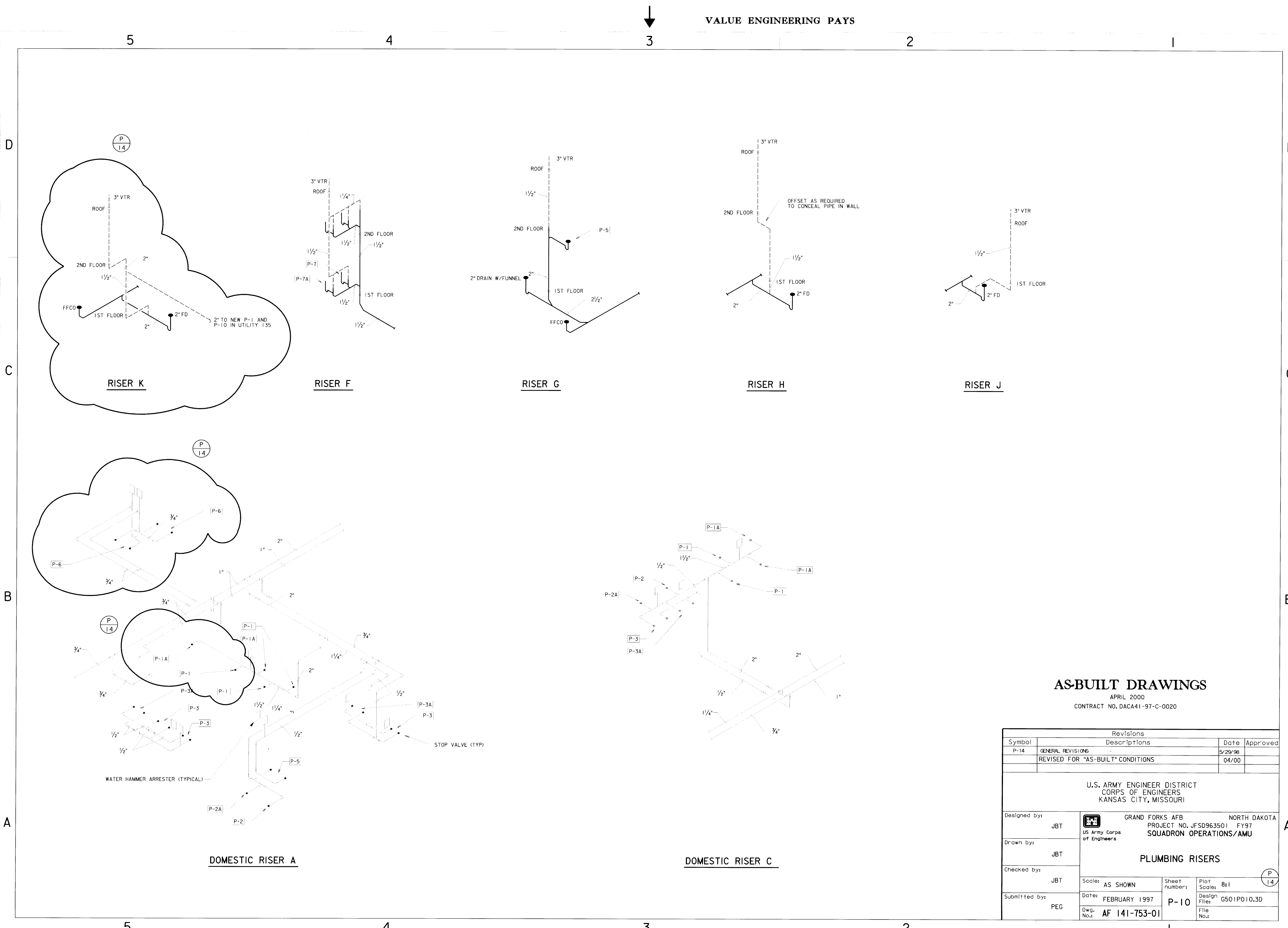


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	JBT	PLUMBING RISERS	
Checked by:	JBT	Scale: AS SHOWN	Sheet number: Plot Scale: 8:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: G501P009.3D
		Dwg. No.: AF 141-753-01	File No.:

63-000- 156-139 P-9



AS-BUILT DRAWINGS

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CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
P-14	GENERAL REVISIONS	5/29/98	
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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: JBT	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: JBT	PLUMBING RISERS		
Checked by: JBT	Scale: AS SHOWN	Sheet number:	Plot Scale: 8:1
Submitted by: PEG	Date: FEBRUARY 1997	P-10	Design File: 6501P010.3D
	Dwg. No.: AF 141-753-01		File No.:

631-000- 156-140 P-10

LIGHTING SYMBOLS

	2' X 4' FLUORESCENT FIXTURE
	2' X 2' FLUORESCENT FIXTURE
	4' FLUORESCENT STRIP FIXTURE
	1' X 4' FLUORESCENT FIXTURE
	2' X 4' FLUORESCENT FIXTURE WITH EM. BATTERY
	1' X 4' FLUORESCENT FIXTURE WITH EM. BATTERY
	2' X 2' FLUORESCENT FIXTURE WITH EM. BATTERY
	1' X 4' WALL MNT FLUORESCENT FIXTURE
	WALL MNT INCANDESCENT, FLUORESCENT OR HID
	CEILING MNT INCANDESCENT, FLUORESCENT OR HID
	HID FIXTURE WITH QUARTZ
	EM. LIGHT SET WITH TWO LAMPS
	EM LIGHT SET WITH 1 LAMP
	CEILING MNT EXIT SIGN
	SINGLE-FACE, WALL MNT EXIT SIGN
	DOUBLE-FACE, WALL MNT EXIT SIGN
	4' FLUORESCENT STRIP FIXTURE
	4' FLUORESCENT STRIP FIXTURE WITH EM. BATTERY
	INFRARED OCCUPANCY SENSOR
	ULTRASONIC OCCUPANCY SENSOR
	WALL MOUNTED DAYLIGHT SENSOR

FIRE ALARM SYMBOLS

	FIRE ALARM PULL STATION, SEE NOTE 2
	FIRE SUPPRESSANT ABORT STATION, SEE NOTE 2
	SMOKE DETECTOR
	HEAT DETECTOR
	COMBINATION SMOKE AND HEAT DETECTOR
	FLAME DETECTOR
	FIRE ALARM BELL, SEE NOTE 3
	FIRE ALARM HORN, SEE NOTE 3
	FIRE ALARM STROBE, SEE NOTE 3
	VALVE TAMPER SWITCH
	WATER FLOW SWITCH
	FIRE ALARM CONTROL PANEL
	REMOTE ANNUNCIATOR PANEL
	FIRE ALARM HORN/STROBE COMBINATION UNIT, SEE NOTE 3
	DOOR HOLDER OR HOLDER/CLOSURE, MNT HEIGHT AS REQUIRED
	ADDRESSABLE INTERFACE DEVICE (LOCATE WITHIN 10 FEET OF NON-ADDRESSABLE DEVICE)

SYMBOL MODIFICATION DESIGNATORS

WP --- WEATHERPROOF
WP/W --- UNLIMITED USE WET LOCATION
WP/RW --- RESTRICTED USE WET LOCATION
WP/D --- DAMP LOCATION
GFI- GROUND FAULT CIRCUIT INTERRUPTOR

POWER AND SPECIAL SYSTEMS SYMBOLS

	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	TRIPLEX RECEPTACLE
	QUADRUPLX RECEPTACLE
	SPLIT WIRED DUPLEX RECEPTACLE
	SIMPLEX SPECIAL PURPOSE OUTLET
	DUPLEX SPECIAL PURPOSE RECEPTACLE
	SPECIAL PURPOSE CONNECTION - PREWIRED FURNITURE BASE POWER FEED
	MULTI-OUTLET STRIP
	SIMPLEX FLOOR RECEPTACLE
	DUPLEX FLOOR RECEPTACLE
	COMBINATION FLOOR RECEPTACLE/TELEPHONE
	SPECIAL PURPOSE FLOOR RECEPTACLE
	MOTOR
	WALL MOUNTED JUNCTION BOX
	CEILING MOUNTED JUNCTION BOX
	SINGLE POLE SWITCH
	DOUBLE POLE SWITCH (DPST)
	THREE WAY SWITCH (SPDT)
	FOUR WAY SWITCH
	SWITCH WITH PILOT LIGHT
	MOMENTARY CONTACT SWITCH
	PUSHBUTTON STATION
	DIMMER SWITCH, SINGLE POLE
	MOTOR RATED SWITCH
	DIMMER SWITCH, 3-WAY
	PHOTOCELL, MNT 10' ABOVE GRADE OUTSIDE, 7' AFF INSIDE
	SURFACE MOUNTED PANELBOARD
	FLUSH MOUNTED PANELBOARD
	MOTOR CONTROL CENTER SECTION
	COMBINATION STARTER/DISCONNECT SWITCH
	DISCONNECT SWITCH
	MOTOR STARTER
	VARIABLE FREQUENCY DRIVE UNIT (ADJUSTABLE SPEED DRIVE)
	BUS DUCT
	CABLE TRAY
	TROLLEY DUCT
	WIREWAY
	WIRING IN CONDUIT. HATCHURES INDICATE THE NUMBER OF CONDUCTORS (EXCLUDING REQUIRED GROUNDING CONDUCTOR). NO HATCHURES INDICATES TWO CONDUCTORS, ARROW INDICATES HOME RUN
	FLEXIBLE CONDUIT
	CONDUIT TURNED UP
	CONDUIT TURNED DOWN

EXTERIOR ELECTRICAL SYMBOLS

EXISTING	NEW	
		POLE
		POLE MOUNTED LIGHTING FIXTURE
		POLE GUY, 12K = 12000LB GUY STRENGTH IN CLASS 7 SOIL
		POLE MOUNTED TRANSFORMER
		PAD MOUNTED TRANSFORMER
		MANHOLE
		HANDHOLE
		PAD MOUNTED SWITCH
		PULLBOX
		UNDERGROUND PRIMARY CONDUCTORS
		UNDERGROUND SECONDARY CONDUCTORS
		UNDERGROUND TELEPHONE CABLES OR COAXIAL CABLES
		AERIAL PRIMARY CONDUCTORS
		AERIAL TELEPHONE CABLES OR COAXIAL CABLES
		CATHODIC PROTECTION ANODE, 17LB
		CATHODIC PROTECTION TEST STATION
		ENGINE BLOCK HEATER PEDESTAL
		AERIAL SECONDARY CONDUCTORS
		JUNCTION PEDESTAL
		TELEPHONE OR COAXIAL CABLE PEDESTAL

ONE-LINE DIAGRAM SYMBOLS

	ANTENNA
	BATTERY
	GROUND
	KILOWATT-HOUR METER
	VARMETER
	FUSE
	ARRESTOR VALVE
	ARRESTOR
	CIRCUIT BREAKER
	THERMAL OVERLOAD DEVICE
	DRAWOUT TYPE CIRCUIT BREAKER
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
	PUSHBUTTON NORMALLY OPEN
	PUSHBUTTON NORMALLY CLOSED
	TWO POSITION SWITCH
	MULTIPOSITION SWITCH
	LIMIT SWITCH NORMALLY OPEN
	LIMIT SWITCH NORMALLY CLOSED
	TIME DELAY ON CLOSE SWITCH, NORMALLY OPEN
	TIME DELAY ON OPEN SWITCH, NORMALLY CLOSED
	TIME DELAY ON CLOSE SWITCH, NORMALLY CLOSED
	TIME DELAY ON OPEN SWITCH, NORMALLY OPEN
	FLOW SWITCH, CLOSE ON INCREASE
	FLOW SWITCH, OPEN ON INCREASE
	LEVEL SWITCH, CLOSE ON RISE
	LEVEL SWITCH, OPEN ON RISE
	PRESSURE SWITCH, CLOSE ON RISE
	PRESSURE SWITCH, OPEN ON RISE
	TEMPERATURE SWITCH, CLOSE ON RISE
	TEMPERATURE SWITCH, OPEN ON RISE
	FOOT SWITCH, CLOSE BY PRESSURE
	FOOT SWITCH, OPEN BY PRESSURE
	TRANSFORMER
	POTENTIAL TRANSFORMER
	CURRENT TRANSFORMER

COMMUNICATION SYMBOLS

	WALL MOUNTED TELEPHONE/DATA OUTLET, SEE NOTE 1
	FLOOR MOUNTED TELEPHONE OUTLET
	FLUSH MOUNTED TELEPHONE CABINET
	SURFACE MOUNTED TELEPHONE CABINET
	WALL MOUNTED INTERCOM OUTLET, SEE NOTE 2
	FLOOR MOUNTED INTERCOM OUTLET
	INTERCOM SYSTEM DEVICE
	RADIO AND PUBLIC ADDRESS SYSTEM DEVICE
	WATCHMANS SYSTEM DEVICE
	SOUND SYSTEM DEVICE
	CABLE TELEVISION OUTLET, SEE NOTE 1
	RADIO AND PUBLIC ADDRESS SYSTEM CONE SPEAKER, CEILING MOUNTED
	RADIO AND PUBLIC ADDRESS SYSTEM HORN SPEAKER, SEE NOTE 4
	RADIO AND PUBLIC ADDRESS SYSTEM VOLUME CONTROL, SEE NOTE 2
	RADIO AND PUBLIC ADDRESS SYSTEM VOLUME CONTROL WITH VOICE PAGING OVERRIDE RELAY, SEE NOTE 2
	FLOOR MOUNTED MICROPHONE JACK
	WALL MOUNTED MICROPHONE JACK, SEE NOTE 1
	WALL MOUNTED TELEPHONE CONNECTION TO PREWIRED FURNITURE. 'X' INDICATES THE QUANTITY OF 4-PAIR CABLES TO BE INSTALLED FROM THE FURNITURE TELEPHONE OUTLETS TO THE BACKBOARD I/O BLOCKS. 'Y' INDICATES THE QUANTITY OF 4-PAIR CABLES TO BE INSTALLED FROM THE FURNITURE DATA OUTLETS TO THE COMMUNICATIONS/DATA EQUIPMENT RACK CROSS CONNECTS
	CEILING MOUNTED JUNCTION BOX
	ANTENNA

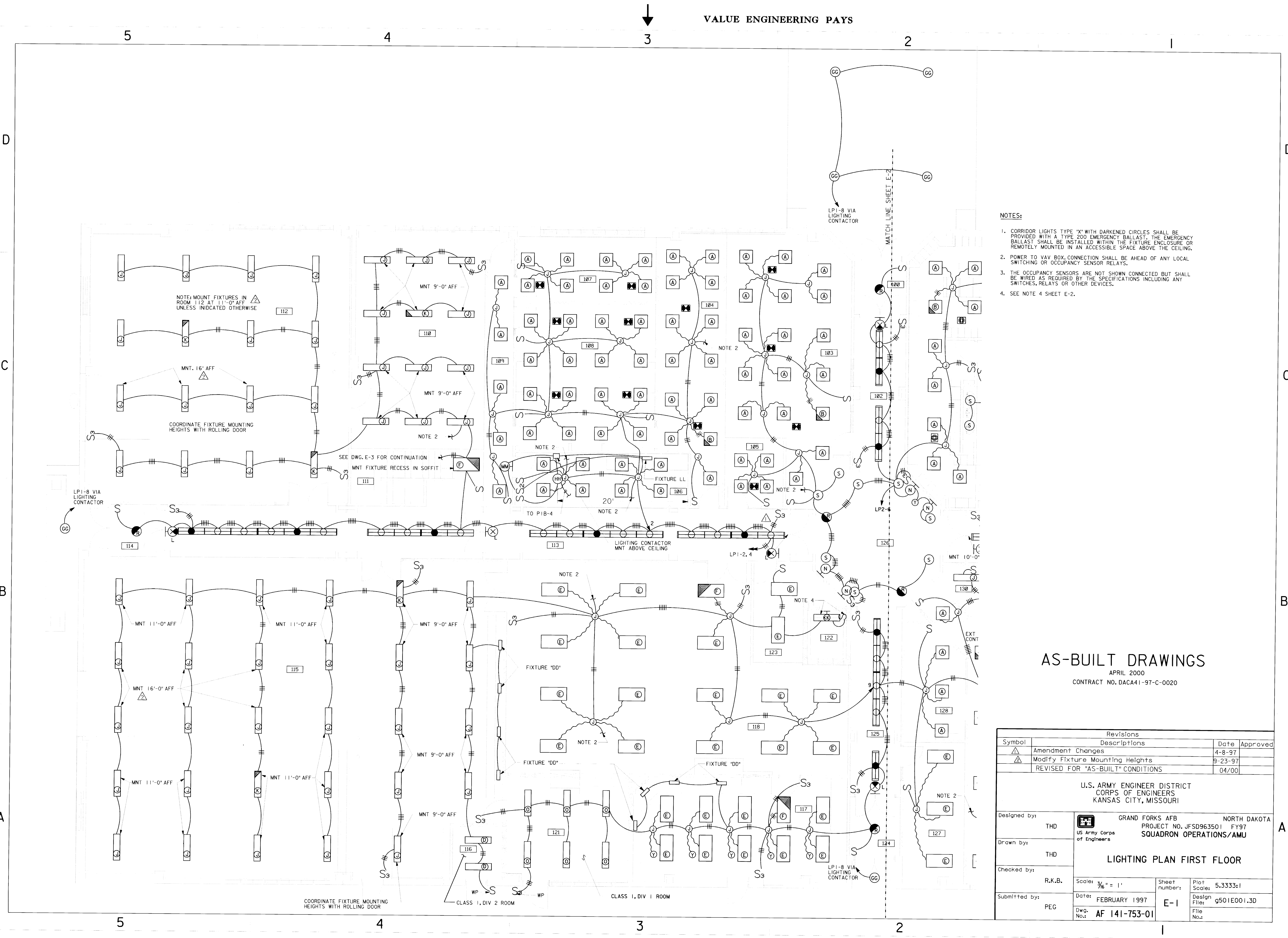
NOTES:

1. DEVICES MOUNTED AT 15" ABOVE FINISHED FLOOR UNLESS INDICATED OTHERWISE
2. DEVICES MOUNTED AT 48" ABOVE FINISHED FLOOR UNLESS INDICATED OTHERWISE
3. DEVICES MOUNTED AT 7' ABOVE FINISHED FLOOR UNLESS INDICATED OTHERWISE
4. DEVICES MOUNTED AT 10' ABOVE FINISHED FLOOR UNLESS INDICATED OTHERWISE

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	T.H.D.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	T.H.D.	ELECTRICAL LEGEND	
Checked by:	R.K.B.	Scale: NONE	Sheet number: X
Submitted by:	P.E.G.	Date: FEBRUARY 1997	Design File: g501E000.2D
	Dwg. No.: AF 141-753-01	E-0	File No.:



- NOTES:
- 1. CORRIDOR LIGHTS TYPE "X" WITH DARKENED CIRCLES SHALL BE PROVIDED WITH A TYPE 200 EMERGENCY BALLAST. THE EMERGENCY BALLAST SHALL BE INSTALLED WITHIN THE FIXTURE ENCLOSURE OR REMOTELY MOUNTED IN AN ACCESSIBLE SPACE ABOVE THE CEILING.
 - 2. POWER TO VAV BOX CONNECTION SHALL BE AHEAD OF ANY LOCAL SWITCHING OR OCCUPANCY SENSOR RELAYS.
 - 3. THE OCCUPANCY SENSORS ARE NOT SHOWN CONNECTED BUT SHALL BE WIRED AS REQUIRED BY THE SPECIFICATIONS INCLUDING ANY SWITCHES, RELAYS OR OTHER DEVICES.
 - 4. SEE NOTE 4 SHEET E-2.

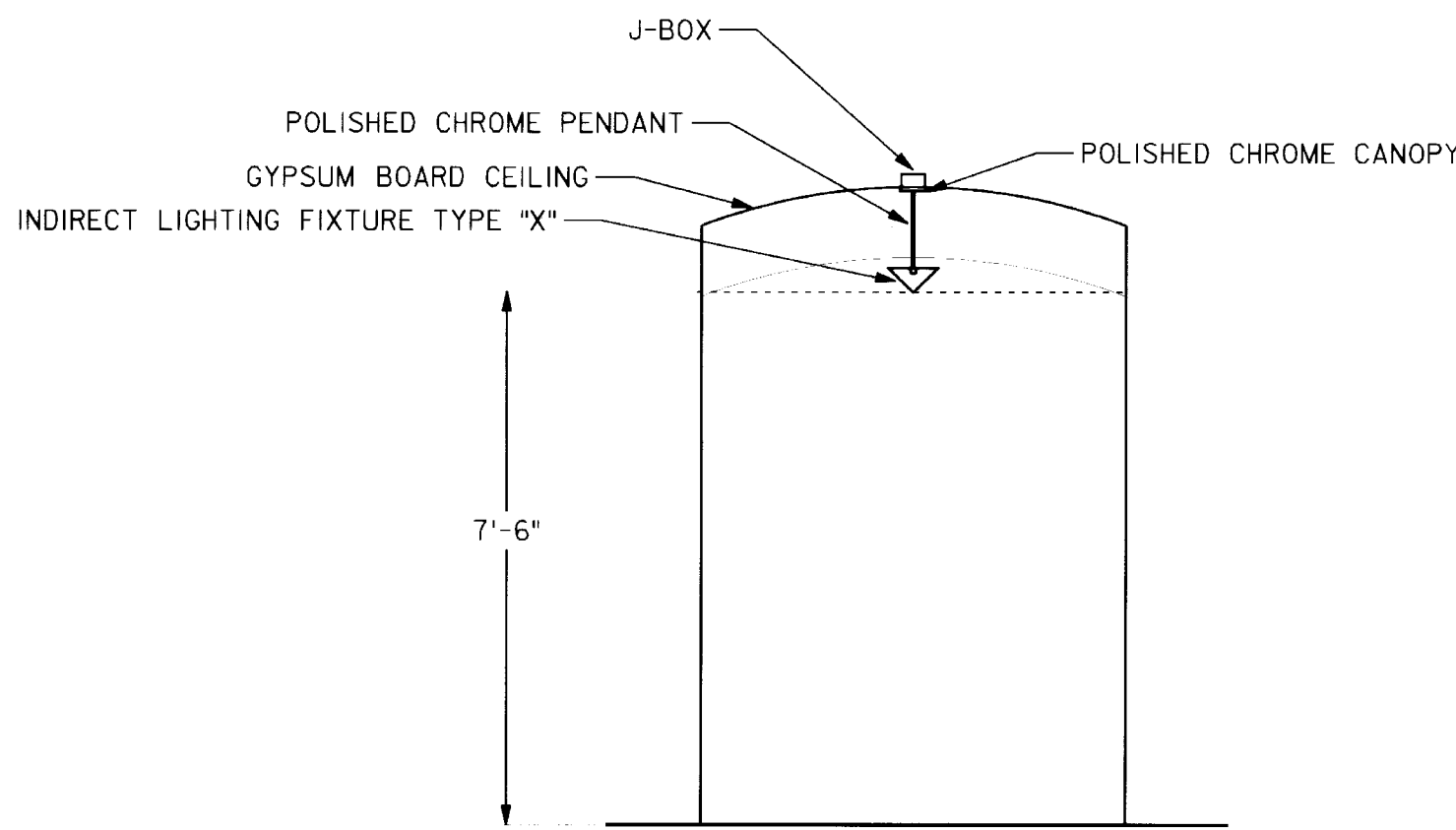
AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
△	Amendment Changes	4-8-97	
△	Modify Fixture Mounting Heights	9-23-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	THD	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU	
Drawn by:	THD	LIGHTING PLAN FIRST FLOOR	
Checked by:	R.K.B.	Scale: 3/16" = 1'	Sheet number: 5.3333:1
Submitted by:	PEG	Date: FEBRUARY 1997	Plot Scale: 5.3333:1
		Dwg. No.: AF 141-753-01	Design File: g501E001.3D
			File No.:

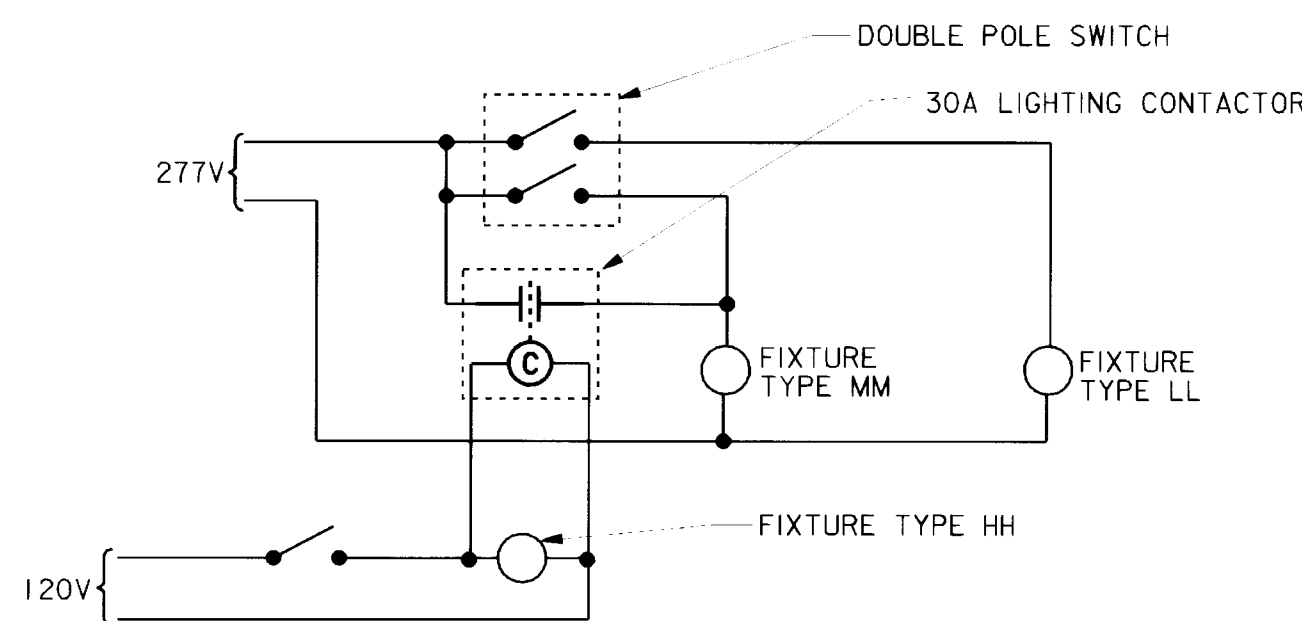
631-00- 156-142 E-1

NOTES:

1. CORRIDOR LIGHTS TYPE "X" WITH DARK CIRCLES SHALL BE PROVIDED WITH 0. TYPE 200 EMERGENCY BALLAST. THE EMERGENCY BALLAST SHALL BE INSTALLED WITHIN THE FIXTURE ENCLOSURE OR REMOTELY MOUNTED IN AN ACCESSIBLE SPACE ABOVE THE CEILING.
2. SEE NOTE 2, SHEET E-1.
3. SEE NOTE 3, SHEET E-1.
4. FIXTURE SHALL BE MOUNTED 3'-0" ABOVE PIT FLOOR. SWITCH SHALL BE MOUNTED 7'-0" ABOVE PIT FLOOR. COORDINATE LOCATIONS WITH LADDER AND ELEVATOR.



CORRIDOR FIXTURE MOUNTING DETAIL

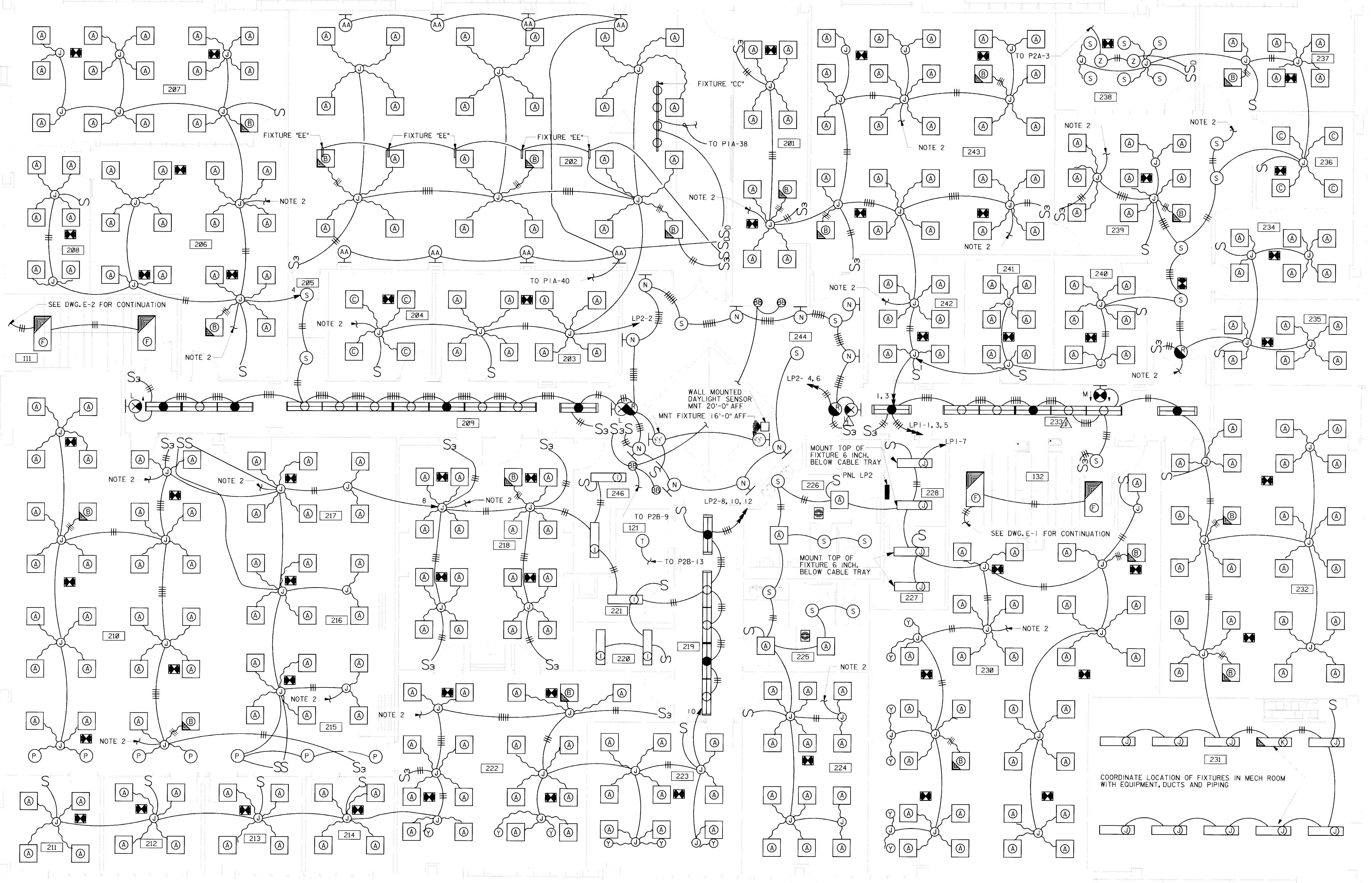


NIGHT VISION GOGGLES ROOM FIXTURE WIRING SCHEMATIC

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
△	Amendment Changes	4-8-97	
P-14	GENERAL REVISIONS	5-29-98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	THD	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	THD	LIGHTING PLAN FIRST FLOOR	
Checked by:	R.K.B.	Scale: 3/16" = 1'	Sheet number: 5.3333:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: g501E002.3D
		Dwg. No.: AF 141-753-01	File No.:



GENERAL NOTES:

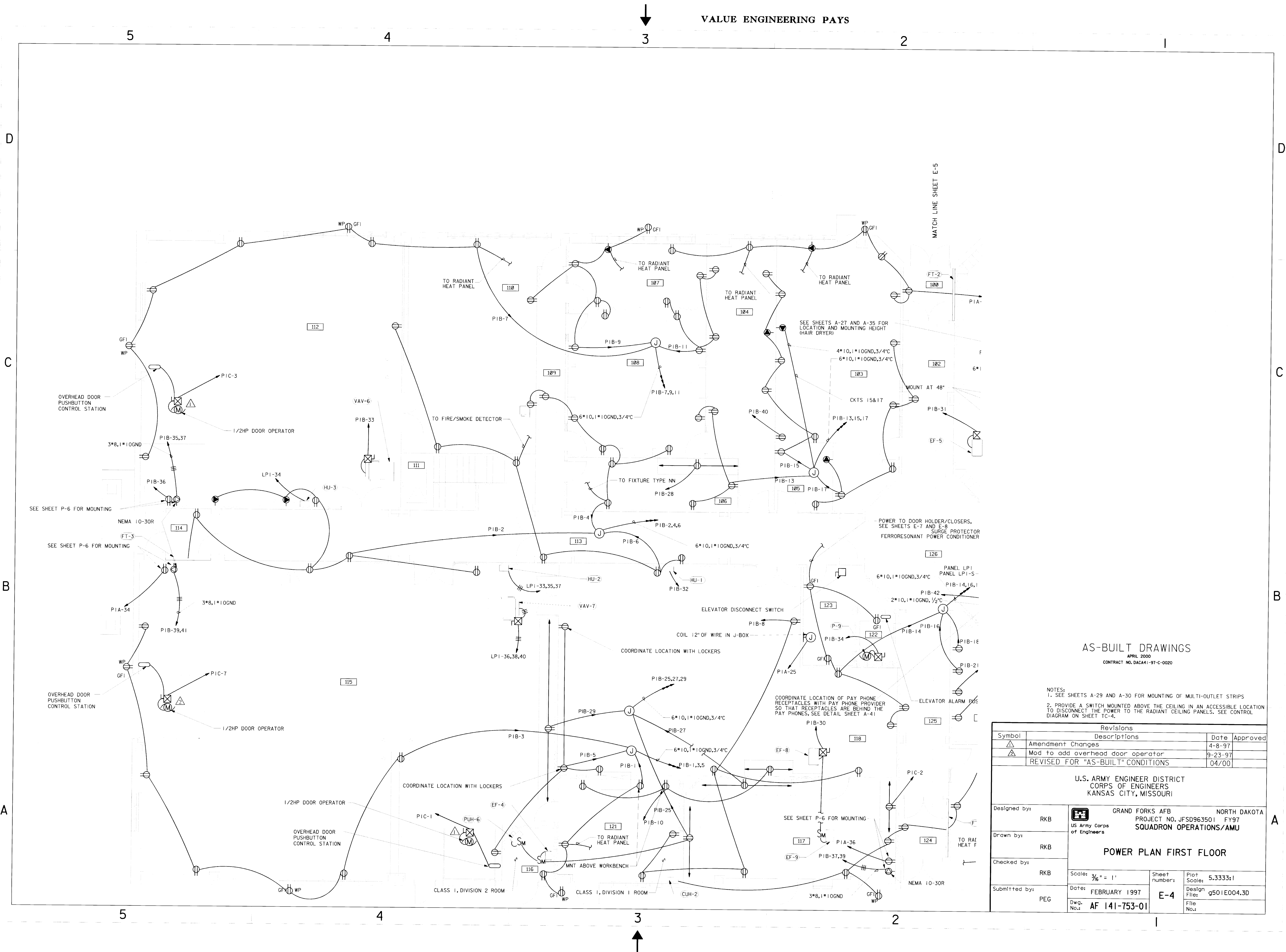
1. CORRIDOR LIGHTS TYPE "X" WITH DARKENED CIRCLES SHALL BE PROVIDED WITH TYPE 200 EMERGENCY BALLAST. THE EMERGENCY BALLAST SHALL BE INSTALLED WITHIN THE FIXTURE ENCLOSURE OR REMOTELY MOUNTED IN AN ACCESSIBLE SPACE ABOVE THE CEILING.
2. SEE NOTE 2, SHEET E-1
3. SEE NOTE 3, SHEET E-1

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	THD	GRAND FORKS AFB US Army Corps of Engineers	NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	THD	LIGHTING PLAN SECOND FLOOR	
Checked by:	R.K.B.	Scale: 3/16" = 1'	Sheet number: 5.3333:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: g501E003.3D
		Dwg. No.: AF 141-753-01	File No.:

63-00- 156-144 E-3



AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020



- NOTES:
1. SEE SHEETS A-29 AND A-30 FOR MOUNTING OF MULTI-OUTLET STRIPS
 2. PROVIDE A SWITCH MOUNTED ABOVE THE CEILING IN AN ACCESSIBLE LOCATION TO DISCONNECT THE POWER TO THE RADIANT CEILING PANELS. SEE CONTROL DIAGRAM ON SHEET TC-4.

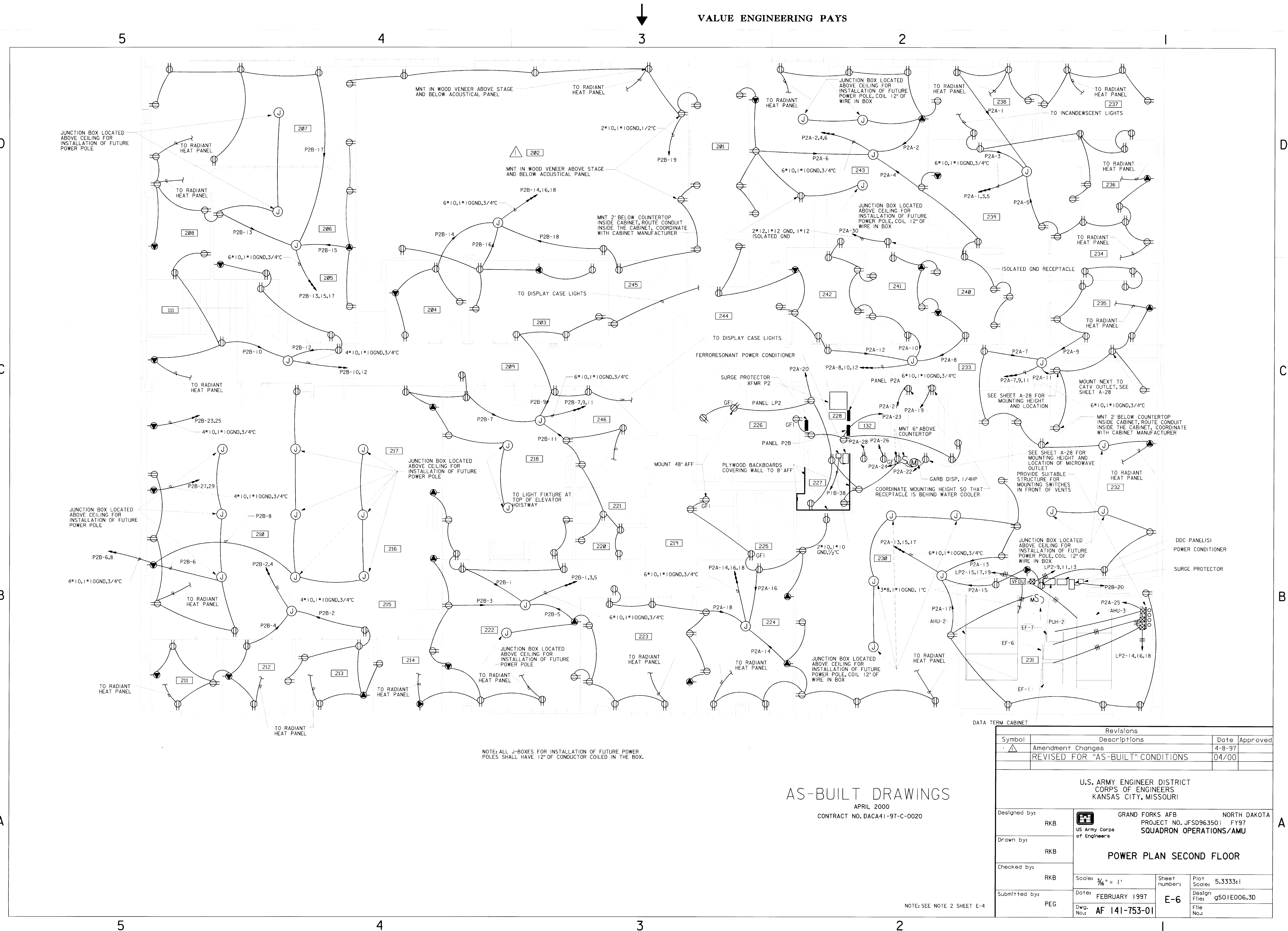
Revisions			
Symbol	Descriptions	Date	Approved
Δ	Amendment Changes	4-8-97	
Δ	Mod to add overhead door operator	9-23-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	RKB	POWER PLAN FIRST FLOOR	
Checked by:	RKB	Scale: 3/8" = 1'	Sheet number: 5.3333:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: g501E004.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000- 156-145 E-4

Revisions		Date	Approved
Symbol △	Descriptions	4-8-97	
P-14	GENERAL REVISIONS		
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

Designed by:	 US Army Corps of Engineers	GRAND FORKS AFB	NORTH DAKOTA
RKB		PROJECT NO. JFSD963501	FY97 SQUADRON OPERATIONS/AMU
Drawn by:		<p>POWER PLAN FIRST FLOOR</p>	
RKB			
Checked by:		<p>E-5</p>	<p>  </p>
RKB			
Submitted by:	Scale: $\frac{3}{16}" = 1'$ Date: FEBRUARY 1997 Dwg. No. AF 141-753-01	Sheet Number:	Plot Scale: 5.3333 Design File: g501E005.3D File No.
PEG			



631-000- 156-147 E-6

NOTES:

1. J-BOX MOUNTED ABOVE CEILING, ROUTE 2 FOUR PAIR TELEPHONE CABLE FROM J-BOX TO TELEPHONE CLOSET, COIL 50 FEET OF EACH CABLE IN THE BOX FOR FUTURE CONNECTION TO TELE-POWER POLE. IN THE TELEPHONE CLOSET, CONNECT ONE CABLE TO A 110 BLOCK AND CONNECT THE OTHER CABLE TO A JACK IN A RACK MOUNTED CROSS CONNECT

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
△	Amendment Changes	4-8-97	
△	Move Outlet	9-23-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB		
Drawn by:	RKB		
Checked by:	RKB		
Submitted by:	PEG		
	Scale: 3/16" = 1'	Sheet number:	Plot Scale: 5:3333:1
	Date: FEBRUARY 1997	E-7	Design File: g501E007.3D
	Dwg. No.: AF 141-753-01		File No.:

631-000- 156-148 E-7

VALUE ENGINEERING PAYS

NOTES:
1. J-BOX MOUNTED ABOVE CEILING. ROUTE 2 FOUR PAIR TELEPHONE CABLE FROM J-BOX TO TELEPHONE CLOSET. COIL 30 FEET OF EACH CABLE IN THE BOX FOR FUTURE CONNECTION TO TELE-POWER POLE. IN THE TELEPHONE CLOSET CONNECT ONE CABLE TO A 110 BLOCK AND CONNECT THE OTHER CABLE TO A JACK IN A RACK MOUNTED CROSS CONNECT

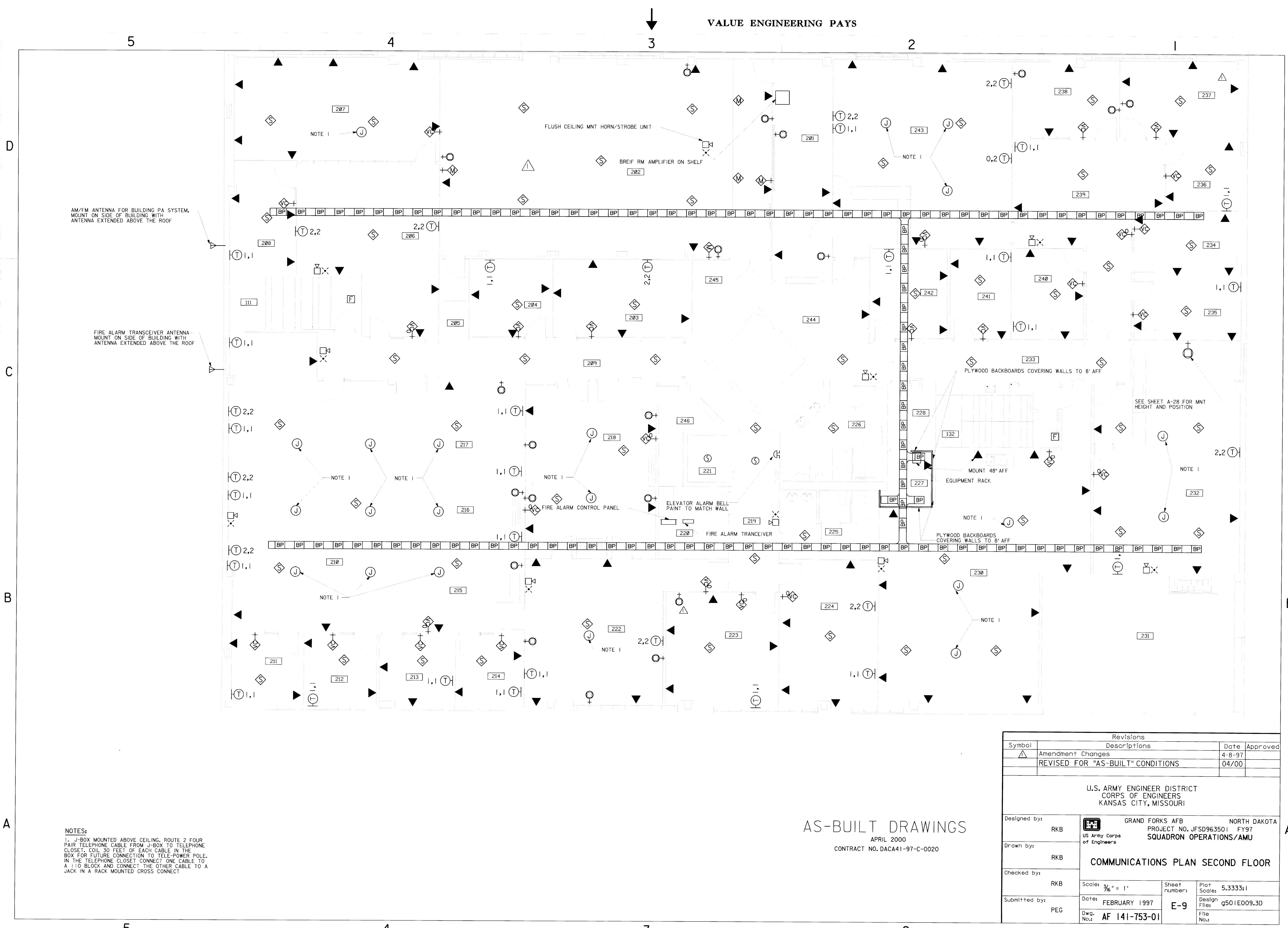
AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
Δ	Amendment Changes	4-8-97	
P-14	GENERAL REVISIONS	5-29-98	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	RKB	COMMUNICATIONS PLAN FIRST FLOOR	
Checked by:	RKB	Scale: $\frac{3}{16}" = 1'$	Sheet number: E-8 Plot Scale: 5.3333 Design File: g501E008.3D
Submitted by:	PEG	Date: FEBRUARY 1997 Dwg. No.: AF 141-753-01	File No.: P 14

631-000- 156-149 E-8

VALUE ENGINEERING PAYS

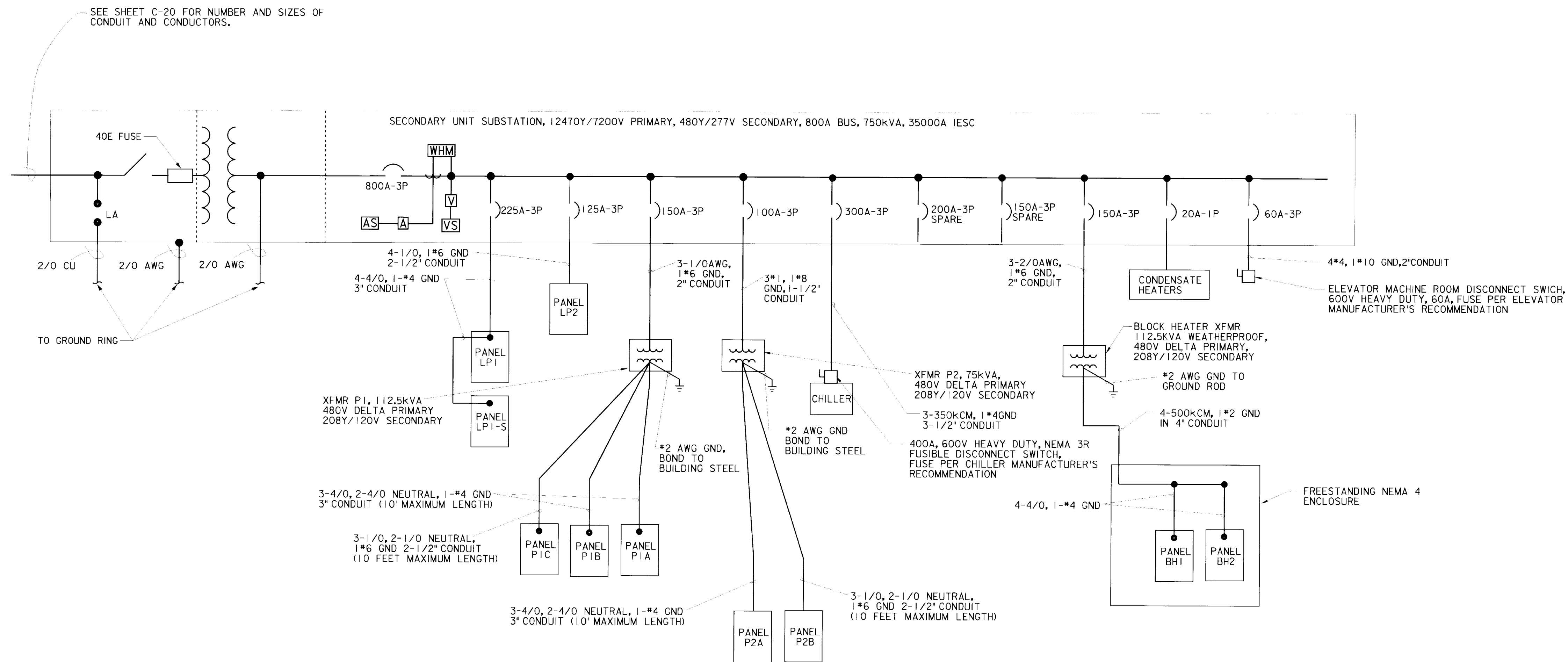


NOTES:
1. J-BOX MOUNTED ABOVE CEILING, ROUTE 2 FOUR PAIR TELEPHONE CABLE FROM J-BOX TO TELEPHONE CLOSET. COIL 30 FEET OF EACH CABLE IN THE BOX FOR FUTURE CONNECTION TO TELE-POWER POLE. IN THE TELEPHONE CLOSET CONNECT ONE CABLE TO A 110 BLOCK AND CONNECT THE OTHER CABLE TO A JACK IN A RACK MOUNTED CROSS CONNECT

AS-BUILT DRAWINGS
APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
Δ	Amendment Changes	4-8-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RKB	GRAND FORKS AFB PROJECT NO. JFSD963501 US Army Corps of Engineers	NORTH DAKOTA FY97 SQUADRON OPERATIONS/AMU
Drawn by:	RKB	COMMUNICATIONS PLAN SECOND FLOOR	
Checked by:	RKB	Scale: 3/16" = 1'	Sheet number: 5.3333:1
Submitted by:	PEG	Date: FEBRUARY 1997	Design File: g501E009.3D
		Dwg. No.: AF 141-753-01	File No.:

631-000- 156-150 E-9



SUPPLEMENTAL LEGEND

- WHM WATTHOUR METER WITH DEMAND REGISTER AND PULSE INITIATORS
- V VOLT METER
- VS VOLT METER SWITCH
- A AMMETER
- AS AMMETER SWITCH

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

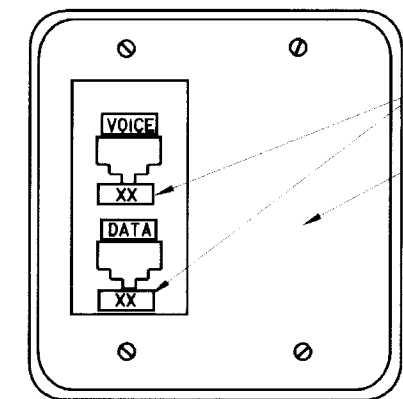
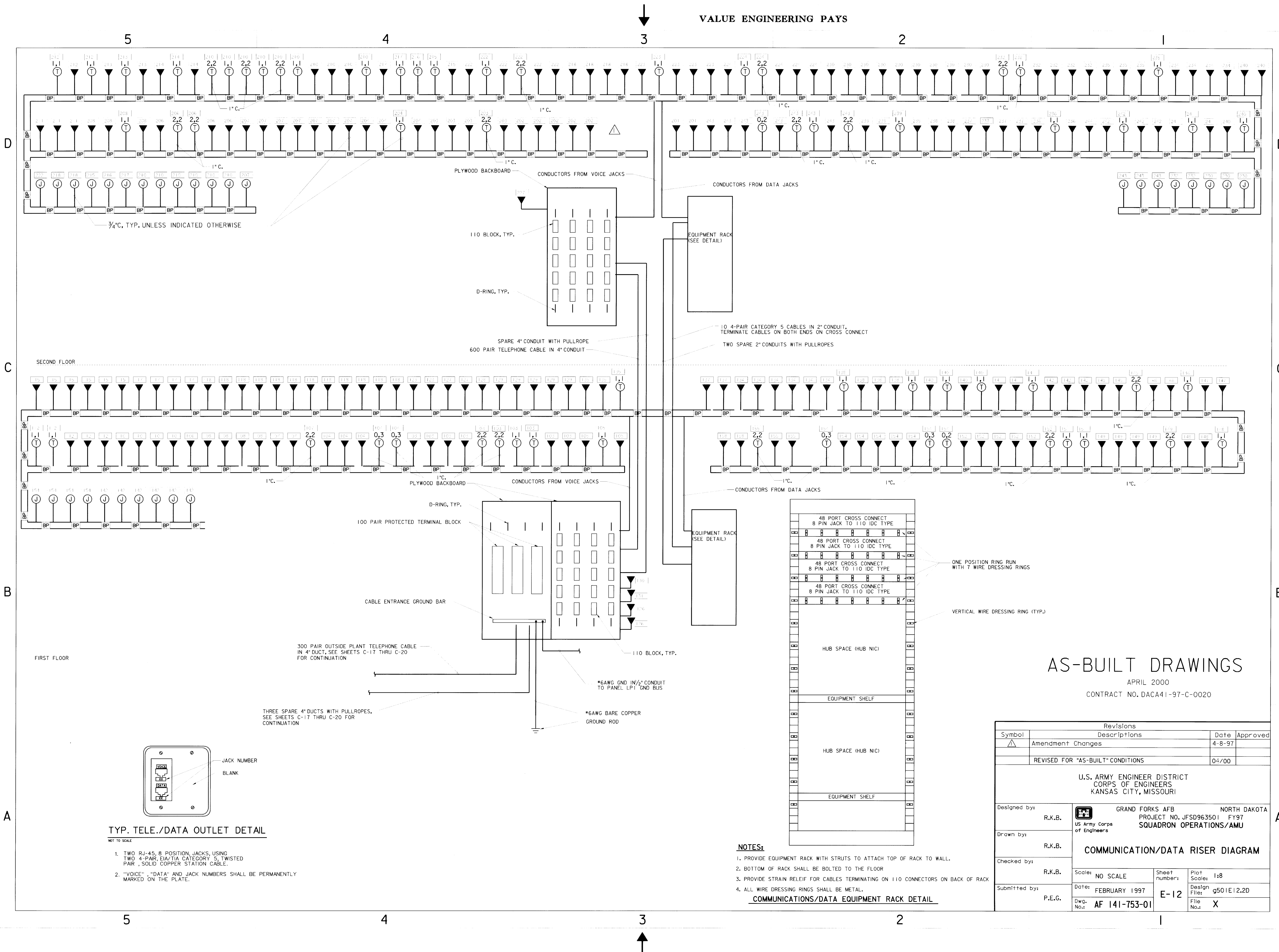
Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: R.K.B.	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 US Army Corps of Engineers SQUADRON OPERATIONS/AMU		
Drawn by: T.H.D.	ONE-LINE DIAGRAM		
Checked by: R.K.B.	Scale: NO SCALE	Sheet number: E-10	Plot Scale: 1:8
Submitted by: P.E.G.	Date: FEBRUARY 1997	Design File: g501E10.2D	File No.: X
	Dwg. No.: AF 141-753-01		

631-00- 156-151 E-10

PANEL LP1										PANEL LP2									
VOLTS= 480Y/277					AMPS= 225					VOLTS= 480Y/277					AMPS= 225				
PHASE 3					PHASE 3					PHASE 3					PHASE 3				
WIRES= 4					WIRES= 4					WIRES= 4					WIRES= 4				
MAIN AND SUB-FEED LUGS					MLO PANELBOARD					MLO PANELBOARD					MLO PANELBOARD				
IESO 14000A					IESO 14000A					IESO 14000A					IESO 14000A				
QKT NO.	TRIP NO.	NO. POLES	LOAD	VA	A	PHASE	B	C	VA	QKT NO.	TRIP NO.	NO. POLES	LOAD	VA	A	PHASE	B	C	VA
1	20	1	LIGHTS	3775	7575				3600	1	20	2	LIGHTS	3675	6570				2895
3	20	1	LIGHTS	3225					3465	3	20	1	LIGHTS	2325					2625
5	20	1	LIGHTS	4290					3360	5	20	1	LIGHTS	2895					4905
7	20	1	LIGHTS	3420	4050				630	7	20	1	LIGHTS	4290	7765				2050
9	20	1	LIGHTS	3625					1700	9	20	3	AHU-3	1330					3475
11	20	1	LIGHTS	3665					2565	11				1330					3150
13	20	1	SPARE	2710					2710	13				1330					1825
15	20	3	BOILER PUMPS	1110					5820	15	40	3	AHU-2	1330	2110				780
17				1110					5820	17				5820					780
19				1110	6930				5820	19				5820	5820				6600
21	20	3	PUMP P-2	1330					1330	21	20	3	SPARE						
23				1330					2660	23									
25				1330	2660				1330	25									
27	20	3	PUMP P-4	277					5820	27									
29				277	6097				5820	29									
31				277	6097				5820	31									
33	20	3	HU-2	3400					6800	33	20	3	HU-2	3400					10800
35				3400					3790	35				3400					390
37				3400	3790				390	37				3400	3790				390
39	20	1	SPARE						390	39	20	1	SPARE						390
41	20	1	SPARE							41	20	1	SPARE						
CONNECTED LOAD = 140A					TOTAL 33812 38592 33397					CONNECTED LOAD = 81A					TOTAL 22265 16630 14660				
SPARE CAPACITY = 25A										SPARE CAPACITY = 16A									

PANEL P1A										PANEL P1B									
VOLTS= 208Y/120					AMPS= 225					VOLTS= 208Y/120					AMPS= 225				
PHASE 3					PHASE 3					PHASE 3					PHASE 3				
WIRES= 4					WIRES= 4					WIRES= 4					WIRES= 4				
225 MCB DOUBLE NEUTRAL					225 MCB DOUBLE NEUTRAL					225 MCB DOUBLE NEUTRAL					225 MCB DOUBLE NEUTRAL				
IESO 10000A					IESO 10000A					IESO 10000A					IESO 10000A				
QKT NO.	TRIP NO.	NO. POLES	LOAD	VA	A	PHASE	B	C	VA	QKT NO.	TRIP NO.	NO. POLES	LOAD	VA	A	PHASE	B	C	VA
1	20	1	RECEPTACLES	1080	1800				720	1	20	1	RECEPTACLES	720	1620				900
3	20	1	RECEPTACLES	1260					1960	3	20	1	RECEPTACLES	1260	2520				1800
5	20	1	RECEPTACLES	1260					2340	5	20	1	RECEPTACLES	720					1080
7	20	1	RECEPTACLES	720	1980				1260	7	20	1	RECEPTACLES	1260	2520				1260
9	20	1	RECEPTACLES	1260					2520	9	20	1	RECEPTACLES	1260	2120				860
11	20	1	RECEPTACLES	1260					2520	11	20	1	RECEPTACLES	1080					2580
13	20	1	RECEPTACLES	1260					2520	13	20	1	RECEPTACLES	780	2000				1220
15	20	1	RECEPTACLES	1260	2520				1260	15	20	1	RECEPTACLES	1260	2760				1500
17	20	1	RECEPTACLES	1260					2520	17	20	1	RECEPTACLES	1260	2760				1260
19	20	1	RECEPTACLES	900	1980				1080	19	20	1	RECEPTACLES	1500	2760				1260
21	20	1	RECEPTACLES	1500					2500	21	20	1	RECEPTACLES	1500	2760				1260
23	20	1	RECEPTACLES	1260					2520	23	20	1	RECEPTACLES	1500	2760				1260
25	20	1	ELEVATOR LIGHTS	1000	1900				900	25	20	1	RECEPTACLES	1120	2120				1000
27	20	1	RECEPTACLES	1080					1980	27	20	1	RECEPTACLES	720	1440				1000
29	20	1	RECEPTACLES	900					2100	29	20	1	RECEPTACLES	1260					1100
31	20	1	VAV-10	830	2030				1200	31	20	1	EF-3	830	2330				1500
33	30	1	HAIR DRYER (MEN)	2300					3700	33	20	1	VAV-6	830	1500				670
35	30	1	HAIR DRYER (WOMEN)	2300					1400	35	30	2	DRYER	2880					4320
37	30	2	DRYER	2880	3380				500	37				2880	4880				2000
39				2880					4080	39	30	2	DRYER	2880	4080				1200
41	20	1	REFRIGERATOR	1000					830	41				2880	3380				500
CONNECTED LOAD = 163A					TOTAL 15590 19600 17170					CONNECTED LOAD = 167A					TOTAL 18230 17180 20080				
SPARE CAPACITY = 25A										SPARE CAPACITY = 25A									

PANEL P2A			VOLTS 208Y/120			AMPS 225			PHASE 3			WIRES 4			225A MCB			DOUBLE NEUTRAL			IESO 10000A					
QKT NO.	TRIP NO.	NO. POLES	LOAD			VA	A	PHASE	B	C	VA	QKT NO.	TRIP NO.	NO. POLES	LOAD			VA	A	PHASE	B	C	VA			
1	20	1	RECEPTACLES			1260	2520				1260	1	20	1	RECEPTACLES			1260	2520				1260			
3	20	1	RECEPTACLES, INCAND LIGHTS			1260				2520	1260	3	20	1	RECEPTACLES			1260	2520				1260			
5	20	1	RECEPTACLES			1260				2520	1260	5	20	1	RECEPTACLES			1260	2520				1260			
7	20	1	RECEPTACLES			1080	2340				1260	7	20	1	RECEPTACLES			1260	2520				1260			
9	20	1	RECEPTACLES			1260				2700	1440	9	20	1	RECEPTACLES			1260	2520				1260			
11	20	1	RECEPTACLES			1080				2340	1260	11	20	1	RECEPTACLES			1260	2520				1260			
13	20	1	RECEPTACLES			1260	2520				1260	13	20	1	RECEPTACLES			1260	2520				1260			
15	20	1	RECEPTACLES			1260				2520	1260	15	20	1	RECEPTACLES			1260	2520				1260			
17	20	1	RECEPTACLES, PUH-2			1140				2400	1260	17	20	1	RECEPTACLES			1080	2160				900			
19	20	1	WATER COOLER			900	1800				900	19	20	1	RECEPTACLES			1080	2080				900			
21	20	1	WATER COOLER			900				2200	1300	21	20	1	RECEPTACLE-MIDCIRCUIT			900	1800				900			
23	20	1	RECEPTACLES			1080				1780	700	23	20	1	GARBAGE DISPOSAL			1080	2160				1080			
25	20	1	EF-7			700	1700				1000	25	20	1	REFRIGERATOR			1080	2160				1080			
27	30	1	COMMUNICATIONS EQUIPMENT RACK			2000				3000	1000	27	30	1	REFRIGERATOR			1080	2160				1080			
29	20	1	SPACE								1500	29	20	1	COPIER			1500	3000				1500			
31	20	1	SPACE									31	20	1	SPARE											
33	20	1	SPACE									33	20	1	SPARE											
35	20	1	SPACE									35	20	1	SPARE											
37	20	1	SPACE									37	20	1	SPACE											
39	20	1	SPACE									39	20	1	SPACE											
41	20	1	SPACE									41	20	1	SPACE											
CONNECTED LOAD - 100A						TOTAL			10880	12940	10540															



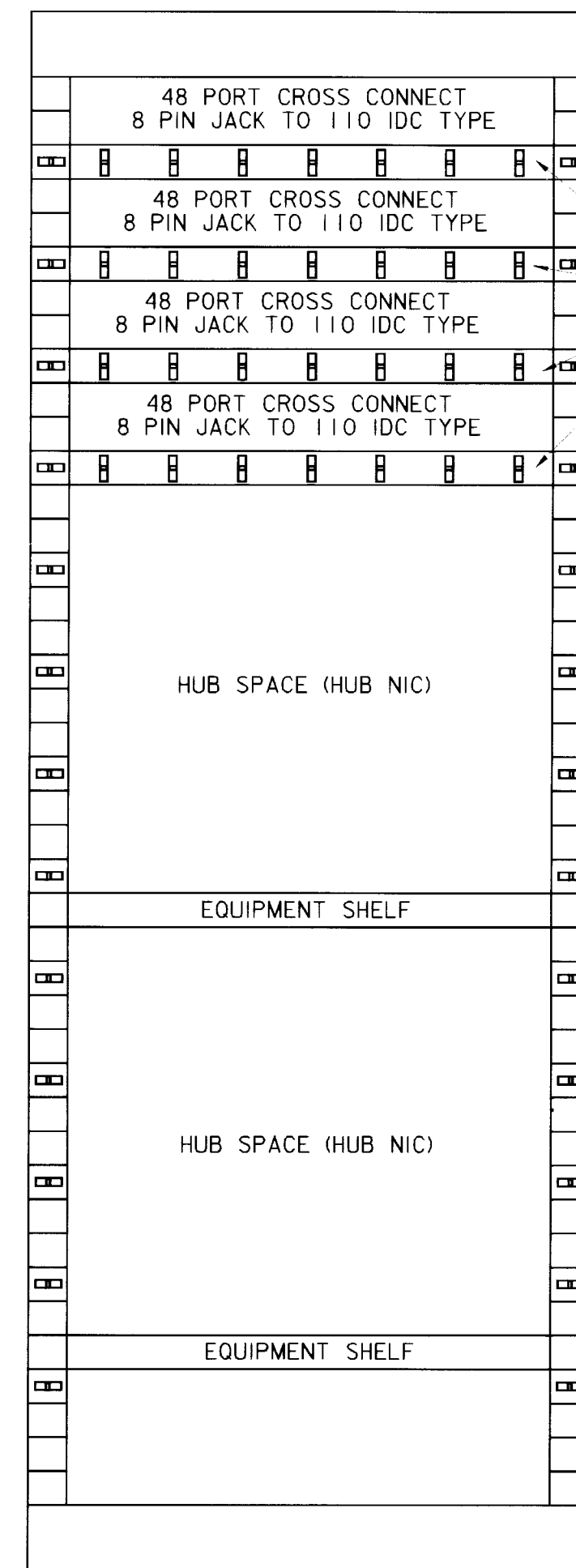
TYP. TELE./DATA OUTLET DETAIL

- NOT TO SCALE
1. TWO RJ-45, 8 POSITION JACKS, USING TWO 4-PAIR, EIA/TIA CATEGORY 5, TWISTED PAIR, SOLID COPPER STATION CABLE.
 2. "VOICE", "DATA" AND JACK NUMBERS SHALL BE PERMANENTLY MARKED ON THE PLATE.

NOTES:

1. PROVIDE EQUIPMENT RACK WITH STRUTS TO ATTACH TOP OF RACK TO WALL.
2. BOTTOM OF RACK SHALL BE BOLTED TO THE FLOOR.
3. PROVIDE STRAIN RELIEF FOR CABLES TERMINATING ON 110 CONNECTORS ON BACK OF RACK.
4. ALL WIRE DRESSING RINGS SHALL BE METAL.

COMMUNICATIONS/DATA EQUIPMENT RACK DETAIL

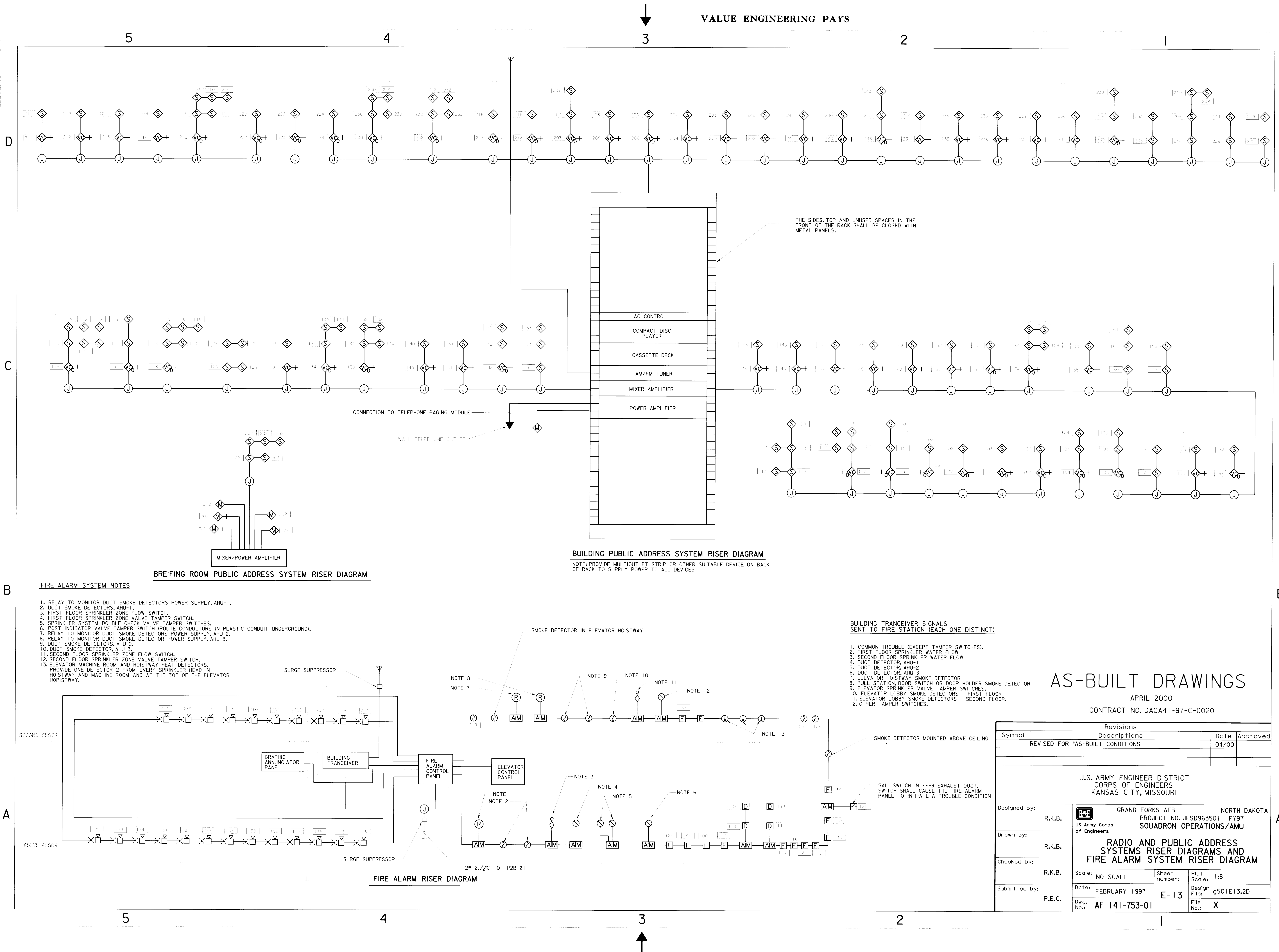


AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
Δ	Amendment Changes	4-8-97	
REVISED FOR "AS-BUILT" CONDITIONS		04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.K.B. GRAND FORKS AFB NORTH DAKOTA US Army Corps of Engineers PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU		
Drawn by:	R.K.B. COMMUNICATION/DATA RISER DIAGRAM		
Checked by:	R.K.B.		
Submitted by:	P.E.G.		
Scale: NO SCALE		Sheet number: E-12	Plot Scale: 1:8
Date: FEBRUARY 1997		Design File: g501E/2.2D	File No.: X
Dwg. No.: AF 141-753-01			

631-00- 156-153 E-12



BREIFING ROOM PUBLIC ADDRESS SYSTEM RISER DIAGRAM

BUILDING PUBLIC ADDRESS SYSTEM RISER DIAGRAM

NOTE: PROVIDE MULTIOUTLET STRIP OR OTHER SUITABLE DEVICE ON BACK OF RACK TO SUPPLY POWER TO ALL DEVICES

FIRE ALARM SYSTEM NOTES

1. RELAY TO MONITOR DUCT SMOKE DETECTORS POWER SUPPLY, AHU-1.
 2. DUCT SMOKE DETECTORS, AHU-1.
 3. FIRST FLOOR SPRINKLER ZONE FLOW SWITCH.
 4. FIRST FLOOR SPRINKLER ZONE VALVE TAMPER SWITCH.
 5. SPRINKLER SYSTEM DOUBLE CHECK VALVE TAMPER SWITCHES.
 6. POST INDICATOR VALVE TAMPER SWITCH (ROUTE CONDUCTORS IN PLASTIC CONDUIT UNDERGROUND).
 7. RELAY TO MONITOR DUCT SMOKE DETECTORS POWER SUPPLY, AHU-2.
 8. RELAY TO MONITOR DUCT SMOKE DETECTOR POWER SUPPLY, AHU-3.
 9. DUCT SMOKE DETECTORS, AHU-2.
 10. DUCT SMOKE DETECTOR, AHU-3.
 11. SECOND FLOOR SPRINKLER ZONE FLOW SWITCH.
 12. SECOND FLOOR SPRINKLER ZONE VALVE TAMPER SWITCH.
 13. ELEVATOR MACHINE ROOM AND HOISTWAY HEAT DETECTORS.
- PROVIDE ONE DETECTOR 2' FROM EVERY SPRINKLER HEAD IN HOISTWAY AND MACHINE ROOM AND AT THE TOP OF THE ELEVATOR HOISTWAY.

BUILDING TRANCEIVER SIGNALS SENT TO FIRE STATION (EACH ONE DISTINCT)

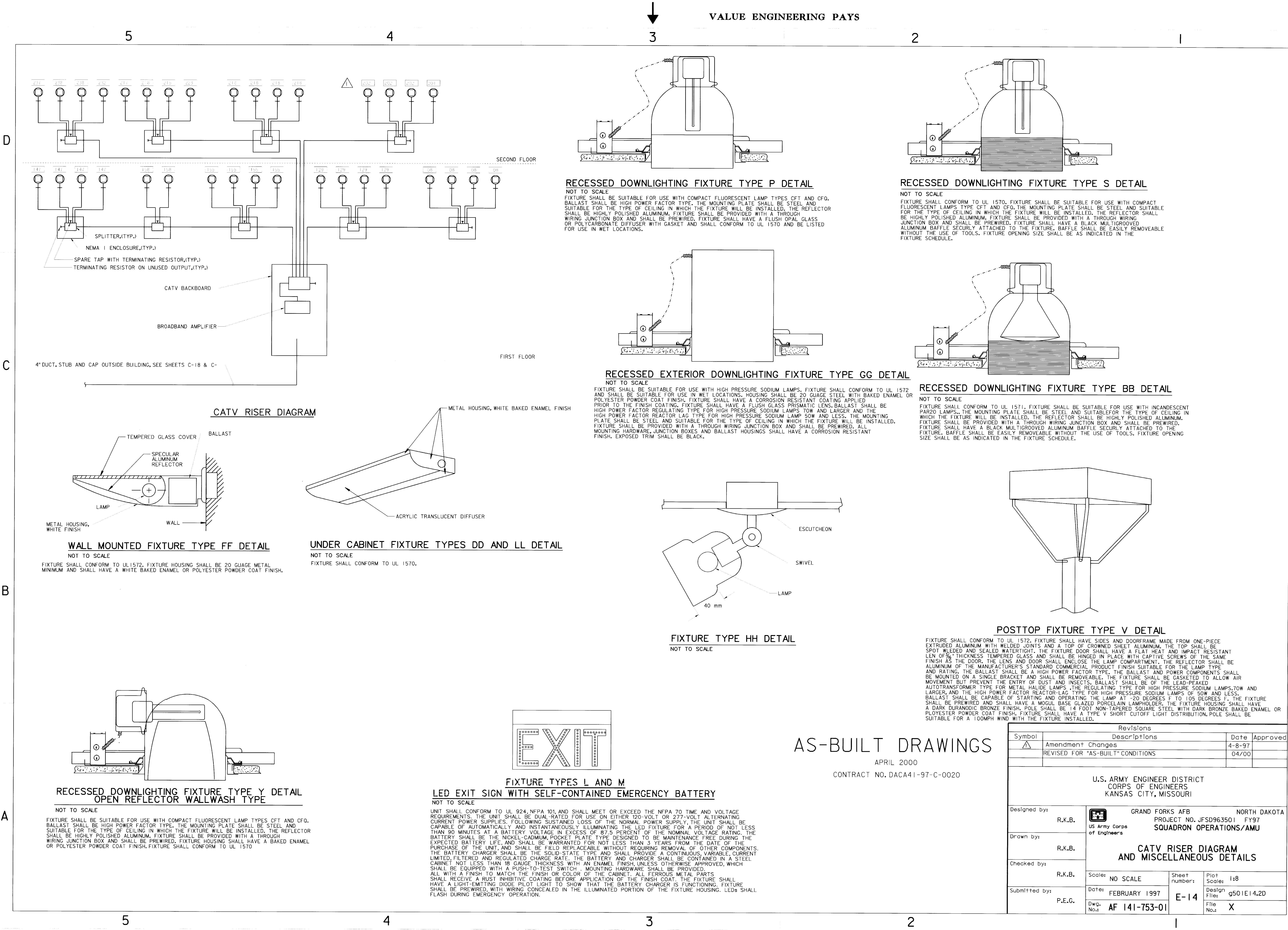
1. COMMON TROUBLE (EXCEPT TAMPER SWITCHES).
2. FIRST FLOOR SPRINKLER WATER FLOW
3. SECOND FLOOR SPRINKLER WATER FLOW
4. DUCT DETECTOR, AHU-1
5. DUCT DETECTOR, AHU-2
6. DUCT DETECTOR, AHU-3
7. ELEVATOR HOISTWAY SMOKE DETECTOR
8. PULL STATION DOOR SWITCH OR DOOR HOLDER SMOKE DETECTOR
9. ELEVATOR SPRINKLER VALVE TAMPER SWITCHES.
10. ELEVATOR LOBBY SMOKE DETECTORS - FIRST FLOOR.
11. ELEVATOR LOBBY SMOKE DETECTORS - SECOND FLOOR.
12. OTHER TAMPER SWITCHES.

AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
<p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</p>			
Designed by:	R.K.B.	<p>GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU</p>	
Drawn by:	R.K.B.	<p>RADIO AND PUBLIC ADDRESS SYSTEMS RISER DIAGRAMS AND FIRE ALARM SYSTEM RISER DIAGRAM</p>	
Checked by:	R.K.B.	Scale: NO SCALE	Sheet number: E-13
Submitted by:	P.E.G.	Date: FEBRUARY 1997	Plot Scale: 1:8
		Dwg. No.: AF 141-753-01	Design File: g501E13.2D
			File No.: X

631-000-156-154 E-13



AS-BUILT DRAWINGS

APRIL 2000
CONTRACT NO. DACA41-97-C-0020

Revisions			
Symbol	Descriptions	Date	Approved
△	Amendment Changes	4-8-97	
	REVISED FOR "AS-BUILT" CONDITIONS	04/00	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.K.B.	US Army Corps of Engineers	GRAND FORKS AFB NORTH DAKOTA PROJECT NO. JFSD963501 FY97 SQUADRON OPERATIONS/AMU
Drawn by:	R.K.B.		
Checked by:	R.K.B.		
Submitted by:	P.E.G.		
Scale: NO SCALE		Sheet number: E-14	Plot scale: 1:8
Date: FEBRUARY 1997		Design File: q501E14.2D	File No.: X
Dwg. No.: AF 141-753-01			

631-000-156-155 E-14

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SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

**APPENDIX D
INSTALLATION FACILITY
STANDARDS (PROVIDED UNDER
SEPARATE COVER)**



**US Army Corps
of Engineers** ®

Omaha District

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX E MECHANICAL LIFE CYCLE COST ANALYSIS



**US Army Corps
of Engineers** ®
Omaha District

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NIST BLCC 5.3-22: Input Data Listing

Consistent with Federal Life Cycle Cost Methodology in OMB Circular A-94

General Information

File Name:	C:\Users\g6edxtw9\Desktop\Fosmer LCCA\New Folder\LCCA.xml
Date of Study:	Thu Nov 10 12:43:25 CST 2022
Analysis Type:	MILCON Analysis, Non-Energy Project
Project Name:	DRP
Project Location:	North Dakota
Analyst:	C. Fosmer
Base Date:	April 1, 2022
Beneficial Occupancy Date:	April 1, 2022
Study Period:	40 years 0 months (April 1, 2022 through March 31, 2062)
Discount Rate:	-0.3%
Discounting Convention:	Mid-Year
Discount and Escalation Rates are REAL (exclusive of general inflation)	

Alternative: Alt 1.

Energy: Electricity

Annual Consumption:	1,126,887.0 kWh
Price per Unit:	\$0.05000
Demand Charge:	\$0
Utility Rebate:	\$0
Location:	Alabama
Rate Schedule:	Residential
State:	North Dakota

Usage Indices

From Date	Duration	Usage Index
April 1, 2022	Remaining	100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	-0.85%
April 1, 2023	1 year 0 months	-1.24%
April 1, 2024	1 year 0 months	-0.55%
April 1, 2025	1 year 0 months	-0.58%
April 1, 2026	1 year 0 months	-0.55%

April 1, 2027	1 year 0 months	-0.25%
April 1, 2028	1 year 0 months	-0.31%
April 1, 2029	1 year 0 months	0.56%
April 1, 2030	1 year 0 months	0.36%
April 1, 2031	1 year 0 months	0.19%
April 1, 2032	1 year 0 months	-0.11%
April 1, 2033	1 year 0 months	-0.5%
April 1, 2034	1 year 0 months	-0.47%
April 1, 2035	1 year 0 months	-0.39%
April 1, 2036	1 year 0 months	-0.42%
April 1, 2037	1 year 0 months	-0.45%
April 1, 2038	1 year 0 months	-0.34%
April 1, 2039	1 year 0 months	-0.17%
April 1, 2040	1 year 0 months	-0.23%
April 1, 2041	1 year 0 months	-0.28%
April 1, 2042	1 year 0 months	-0.46%
April 1, 2043	1 year 0 months	-0.46%
April 1, 2044	1 year 0 months	-0.32%
April 1, 2045	1 year 0 months	-0.26%
April 1, 2046	1 year 0 months	-0.26%
April 1, 2047	1 year 0 months	-0.32%
April 1, 2048	1 year 0 months	-0.5%
April 1, 2049	1 year 0 months	-0.56%
April 1, 2050	1 year 0 months	-0.44%
April 1, 2051	1 year 0 months	-0.38%
April 1, 2052	Remaining	-0.44%

Energy: Natural Gas

Annual Consumption:	5,397.0 Therm
Price per Unit:	\$0.45000
Demand Charge:	\$0
Utility Rebate:	\$0
End-Use:	Industrial Boiler, uncontrolled
Rate Schedule:	Residential
State:	North Dakota

Usage Indices

From Date	Duration	Usage Index
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April 1, 2022 Remaining 100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	−6.61%
April 1, 2023	1 year 0 months	−5.39%
April 1, 2024	1 year 0 months	−2.23%
April 1, 2025	1 year 0 months	−0.46%
April 1, 2026	1 year 0 months	0.69%
April 1, 2027	1 year 0 months	1.59%
April 1, 2028	1 year 0 months	2.35%
April 1, 2029	1 year 0 months	1.2%
April 1, 2030	1 year 0 months	1.19%
April 1, 2031	1 year 0 months	0.53%
April 1, 2032	1 year 0 months	0.96%
April 1, 2033	1 year 0 months	0.42%
April 1, 2034	1 year 0 months	−0.21%
April 1, 2035	1 year 0 months	0%
April 1, 2036	1 year 0 months	0.32%
April 1, 2037	1 year 0 months	0.31%
April 1, 2038	1 year 0 months	0.31%
April 1, 2039	1 year 0 months	0.21%
April 1, 2040	1 year 0 months	0.31%
April 1, 2041	1 year 0 months	0%
April 1, 2042	1 year 0 months	0.1%
April 1, 2043	1 year 0 months	−0.1%
April 1, 2044	1 year 0 months	−0.1%
April 1, 2045	1 year 0 months	0%
April 1, 2046	1 year 0 months	0.1%
April 1, 2047	1 year 0 months	0.1%
April 1, 2048	1 year 0 months	0.1%
April 1, 2049	1 year 0 months	0.21%
April 1, 2050	1 year 0 months	0.1%
April 1, 2051	1 year 0 months	0.1%
April 1, 2052	Remaining	0.12%

Component: AHUs

Initial Investment

Initial Cost (base-year \$):	\$101,000
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%		
Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: AHU replace

Years/Months:	20 years 0 months
Amount:	\$101,000
Annual Rate Of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Routine Recurring OM&R: AHU Maint

Amount:	\$522
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Backup Chiller 90 ton

Initial Investment

Initial Cost (base-year \$):	\$85,000
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%		
Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Chiller Replace

Years/Months:	20 years 0 months
Amount:	\$85,000
Annual Rate Of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Routine Recurring OM&R: Chiller Maint

Amount:	\$400
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Boilers 2x600MBH

Initial Investment

Initial Cost (base-year \$):	\$31,000
Annual Rate of Increase:	0%
Expected Asset Life:	25 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor:	0%
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Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Boiler Replace

Years/Months:	25 years 0 months
Amount:	\$31,000
Annual Rate Of Increase:	0%
Expected Asset Life:	25 years 0 months
Residual Value Factor:	40%

Routine Recurring OM&R: Boiler Maint

Amount:	\$482
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Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Chiller 135 ton

Initial Investment

Initial Cost (base-year \$): \$115,000

Annual Rate of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: Chiller Replace

Years/Months: 20 years 0 months

Amount: \$115,000

Annual Rate Of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Routine Recurring OM&R: Copy of: Chiller Maint

Amount: \$400

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Alternative: Alt 2

Energy: Electricity

Annual Consumption: 1,120,498.0 kWh

Price per Unit: \$0.05000

Demand Charge:	\$0
Utility Rebate:	\$0
Location:	Alabama
Rate Schedule:	Residential
State:	North Dakota

Usage Indices

From Date	Duration	Usage Index
April 1, 2022	Remaining	100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	-0.85%
April 1, 2023	1 year 0 months	-1.24%
April 1, 2024	1 year 0 months	-0.55%
April 1, 2025	1 year 0 months	-0.58%
April 1, 2026	1 year 0 months	-0.55%
April 1, 2027	1 year 0 months	-0.25%
April 1, 2028	1 year 0 months	-0.31%
April 1, 2029	1 year 0 months	0.56%
April 1, 2030	1 year 0 months	0.36%
April 1, 2031	1 year 0 months	0.19%
April 1, 2032	1 year 0 months	-0.11%
April 1, 2033	1 year 0 months	-0.5%
April 1, 2034	1 year 0 months	-0.47%
April 1, 2035	1 year 0 months	-0.39%
April 1, 2036	1 year 0 months	-0.42%
April 1, 2037	1 year 0 months	-0.45%
April 1, 2038	1 year 0 months	-0.34%
April 1, 2039	1 year 0 months	-0.17%
April 1, 2040	1 year 0 months	-0.23%
April 1, 2041	1 year 0 months	-0.28%
April 1, 2042	1 year 0 months	-0.46%
April 1, 2043	1 year 0 months	-0.46%
April 1, 2044	1 year 0 months	-0.32%
April 1, 2045	1 year 0 months	-0.26%
April 1, 2046	1 year 0 months	-0.26%
April 1, 2047	1 year 0 months	-0.32%

April 1, 2047	1 year 0 months	-0.52%
April 1, 2048	1 year 0 months	-0.5%
April 1, 2049	1 year 0 months	-0.56%
April 1, 2050	1 year 0 months	-0.44%
April 1, 2051	1 year 0 months	-0.38%
April 1, 2052	Remaining	-0.44%

Energy: Natural Gas

Annual Consumption:	3,251.0 Therm
Price per Unit:	\$0.45000
Demand Charge:	\$0
Utility Rebate:	\$0
End-Use:	Industrial Boiler, uncontrolled
Rate Schedule:	Residential
State:	North Dakota

Usage Indices

From Date	Duration	Usage Index
April 1, 2022	Remaining	100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	-6.61%
April 1, 2023	1 year 0 months	-5.39%
April 1, 2024	1 year 0 months	-2.23%
April 1, 2025	1 year 0 months	-0.46%
April 1, 2026	1 year 0 months	0.69%
April 1, 2027	1 year 0 months	1.59%
April 1, 2028	1 year 0 months	2.35%
April 1, 2029	1 year 0 months	1.2%
April 1, 2030	1 year 0 months	1.19%
April 1, 2031	1 year 0 months	0.53%
April 1, 2032	1 year 0 months	0.96%
April 1, 2033	1 year 0 months	0.42%
April 1, 2034	1 year 0 months	-0.21%
April 1, 2035	1 year 0 months	0%
April 1, 2036	1 year 0 months	0.32%
April 1, 2037	1 year 0 months	0.31%
April 1, 2038	1 year 0 months	0.21%

April 1, 2038	1 year 0 months	0.31%
April 1, 2039	1 year 0 months	0.21%
April 1, 2040	1 year 0 months	0.31%
April 1, 2041	1 year 0 months	0%
April 1, 2042	1 year 0 months	0.1%
April 1, 2043	1 year 0 months	-0.1%
April 1, 2044	1 year 0 months	-0.1%
April 1, 2045	1 year 0 months	0%
April 1, 2046	1 year 0 months	0.1%
April 1, 2047	1 year 0 months	0.1%
April 1, 2048	1 year 0 months	0.1%
April 1, 2049	1 year 0 months	0.21%
April 1, 2050	1 year 0 months	0.1%
April 1, 2051	1 year 0 months	0.1%
April 1, 2052	Remaining	0.12%

Component: Copy of: AHUs

Initial Investment

Initial Cost (base-year \$):	\$101,000
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%		
Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: AHU replace

Years/Months:	20 years 0 months
Amount:	\$101,000
Annual Rate Of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Routine Recurring OM&R: Copy of: AHU Maint

Amount:	\$522
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Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: WTW HP 50ton

Initial Investment

Initial Cost (base-year \$):	\$57,000
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: HP Replace

Years/Months:	20 years 0 months
Amount:	\$57,000
Annual Rate Of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Routine Recurring OM&R: Copy of: Chiller Maint

Amount:	\$400
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Backup Boiler

Initial Investment

Initial Cost (base-year \$):	\$15,500
Annual Rate of Increase:	0%

Expected Asset Life: 25 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: Boiler Replace

Years/Months: 25 years 0 months

Amount: \$15,500

Annual Rate Of Increase: 0%

Expected Asset Life: 25 years 0 months

Residual Value Factor: 40%

Routine Recurring OM&R: Copy of: Boiler Maint

Amount: \$482

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Geothermal Wells x60

Initial Investment

Initial Cost (base-year \$): \$210,000

Annual Rate of Increase: 0%

Expected Asset Life: 40 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Routine Recurring OM&R: Well Maint

Amount: \$2,000

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Chiller 135 ton

Initial Investment

Initial Cost (base-year \$):	\$115,000
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor:	0%
-------------------------	----

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: Chiller Replace

Years/Months:	20 years 0 months
Amount:	\$115,000
Annual Rate Of Increase:	0%
Expected Asset Life:	20 years 0 months
Residual Value Factor:	0%

Routine Recurring OM&R: Copy of: Chiller Maint

Amount:	\$400
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: WTW HP 40ton

Initial Investment

Initial Cost (base-year \$):	\$48,300
Annual Rate of Increase:	0%
Expected Asset Life:	20 years 0 months

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: HP Replace

Years/Months: 20 years 0 months

Amount: \$48,300

Annual Rate Of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Routine Recurring OM&R: Copy of: Copy of: Chiller Maint

Amount: \$400

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Alternative: Alt 3

Energy: Electricity

Annual Consumption: 1,087,850.0 kWh

Price per Unit: \$0.05000

Demand Charge: \$0

Utility Rebate: \$0

Location: Alabama

Rate Schedule: Residential

State: North Dakota

Usage Indices

From Date	Duration	Usage Index
April 1, 2022	Remaining	100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	−0.85%
April 1, 2023	1 year 0 months	−1.24%
April 1, 2024	1 year 0 months	−0.55%
April 1, 2025	1 year 0 months	−0.58%
April 1, 2026	1 year 0 months	−0.55%
April 1, 2027	1 year 0 months	−0.25%
April 1, 2028	1 year 0 months	−0.31%
April 1, 2029	1 year 0 months	0.56%
April 1, 2030	1 year 0 months	0.36%
April 1, 2031	1 year 0 months	0.19%
April 1, 2032	1 year 0 months	−0.11%
April 1, 2033	1 year 0 months	−0.5%
April 1, 2034	1 year 0 months	−0.47%
April 1, 2035	1 year 0 months	−0.39%
April 1, 2036	1 year 0 months	−0.42%
April 1, 2037	1 year 0 months	−0.45%
April 1, 2038	1 year 0 months	−0.34%
April 1, 2039	1 year 0 months	−0.17%
April 1, 2040	1 year 0 months	−0.23%
April 1, 2041	1 year 0 months	−0.28%
April 1, 2042	1 year 0 months	−0.46%
April 1, 2043	1 year 0 months	−0.46%
April 1, 2044	1 year 0 months	−0.32%
April 1, 2045	1 year 0 months	−0.26%
April 1, 2046	1 year 0 months	−0.26%
April 1, 2047	1 year 0 months	−0.32%
April 1, 2048	1 year 0 months	−0.5%
April 1, 2049	1 year 0 months	−0.56%
April 1, 2050	1 year 0 months	−0.44%
April 1, 2051	1 year 0 months	−0.38%
April 1, 2052	Remaining	−0.44%

Energy: Natural Gas

Annual Consumption:	37.0 Therm
Price per Unit:	\$0.45000
Demand Charge:	\$0

Utility Rebate: \$0

End-Use: Industrial Boiler, uncontrolled

Rate Schedule: Residential

State: North Dakota

Usage Indices

From Date	Duration	Usage Index
April 1, 2022	Remaining	100%

Escalation Rates

From Date	Duration	Escalation
April 1, 2022	1 year 0 months	-6.61%
April 1, 2023	1 year 0 months	-5.39%
April 1, 2024	1 year 0 months	-2.23%
April 1, 2025	1 year 0 months	-0.46%
April 1, 2026	1 year 0 months	0.69%
April 1, 2027	1 year 0 months	1.59%
April 1, 2028	1 year 0 months	2.35%
April 1, 2029	1 year 0 months	1.2%
April 1, 2030	1 year 0 months	1.19%
April 1, 2031	1 year 0 months	0.53%
April 1, 2032	1 year 0 months	0.96%
April 1, 2033	1 year 0 months	0.42%
April 1, 2034	1 year 0 months	-0.21%
April 1, 2035	1 year 0 months	0%
April 1, 2036	1 year 0 months	0.32%
April 1, 2037	1 year 0 months	0.31%
April 1, 2038	1 year 0 months	0.31%
April 1, 2039	1 year 0 months	0.21%
April 1, 2040	1 year 0 months	0.31%
April 1, 2041	1 year 0 months	0%
April 1, 2042	1 year 0 months	0.1%
April 1, 2043	1 year 0 months	-0.1%
April 1, 2044	1 year 0 months	-0.1%
April 1, 2045	1 year 0 months	0%
April 1, 2046	1 year 0 months	0.1%
April 1, 2047	1 year 0 months	0.1%
April 1, 2048	1 year 0 months	0.1%

April 1, 2049	1 year 0 months	0.21%
April 1, 2050	1 year 0 months	0.1%
April 1, 2051	1 year 0 months	0.1%
April 1, 2052	Remaining	0.12%

Component: Water to Air Heat Pumps 13x3Ton

Initial Investment

Initial Cost (base-year \$):	\$53,325
Annual Rate of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%		
Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: W2A HP replace

Years/Months:	19 years 0 months
Amount:	\$53,325
Annual Rate Of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	0%

Major Repair and Replacement: Copy of: W2A HP replace

Years/Months:	38 years 0 months
Amount:	\$53,325
Annual Rate Of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	95%

Routine Recurring OM&R: W2A HP Maint

Amount:	\$1,900
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Dedicated Outdoor Air System

Initial Investment

Initial Cost (base-year \$): \$18,700

Annual Rate of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: DOAS Replace

Years/Months: 20 years 0 months

Amount: \$18,700

Annual Rate Of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Routine Recurring OM&R: Doas Maint

Amount: \$500

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Backup Boiler

Initial Investment

Initial Cost (base-year \$): \$15,500

Annual Rate of Increase: 0%

Expected Asset Life: 25 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Backup Boiler Replace

Years/Months:	25 years 0 months
Amount:	\$115,500
Annual Rate Of Increase:	0%
Expected Asset Life:	25 years 0 months
Residual Value Factor:	40%

Routine Recurring OM&R: Backup Boiler Maint

Amount:	\$241
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Copy of: Geothermal Wells x60

Initial Investment

Initial Cost (base-year \$):	\$210,000
Annual Rate of Increase:	0%
Expected Asset Life:	40 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Routine Recurring OM&R: Copy of: Well Maint

Amount:	\$2,000
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Water to Air Heat Pumps 50Ton

Initial Investment

Initial Cost (base-year \$):	\$171,000
Annual Rate of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: W2A HP replace

Years/Months:	19 years 0 months
Amount:	\$171,000
Annual Rate Of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	0%

Major Repair and Replacement: Copy of: Copy of: W2A HP replace

Years/Months:	38 years 0 months
Amount:	\$171,000
Annual Rate Of Increase:	0%
Expected Asset Life:	19 years 0 months
Residual Value Factor:	95%

Routine Recurring OM&R: Copy of: W2A HP Maint

Amount:	\$4,000
Annual Rate of Increase:	0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

Component: Copy of: Chiller

Initial Investment

Initial Cost (base-year \$): \$115,000

Annual Rate of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Cost-Phasing

Cost Adjustment Factor: 0%

Years/Months (from Date)	Date	Portion
0 years 0 months	April 1, 2022	100%

Major Repair and Replacement: Copy of: Chiller Replace

Years/Months: 20 years 0 months

Amount: \$115,000

Annual Rate Of Increase: 0%

Expected Asset Life: 20 years 0 months

Residual Value Factor: 0%

Routine Recurring OM&R: Copy of: Chiller Maint

Amount: \$400

Annual Rate of Increase: 0%

Usage Indices

From Date	Duration	Factor
April 1, 2022	Remaining	100%

NIST BLCC 5.3-22: Detailed LCC Analysis

Consistent with Federal Life Cycle Cost Methodology in OMB Circular A-94

General Information

File Name:	C:\Users\g6edxtw9\Desktop\Fosmer LCCA\New Folder\LCCA.xml
Date of Study:	Thu Nov 10 12:42:00 CST 2022
Analysis Type:	MILCON Analysis, Non-Energy Project
Project Name:	DRP
Project Location:	North Dakota
Analyst:	C. Fosmer
Base Date:	April 1, 2022
Beneficial Occupancy Date:	April 1, 2022
Study Period:	40 years 0 months (April 1, 2022 through March 31, 2062)
Discount Rate:	-0.3%
Discounting Convention:	Mid-Year
Discount and Escalation Rates are REAL (exclusive of general inflation)	

Alternative: Alt 1.

Initial Cost Data (not Discounted)

Initial Capital Costs

(adjusted for price escalation)

Initial Capital Costs for All Components: \$332,000

Component: AHUs

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$101,000
-----		-----
Total (for Component)		\$101,000

Component: Backup Chiller 90 ton

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$85,000
-----		-----
Total (for Component)		\$85,000

Component: Boilers 2x600MBH

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$31,000

Total (for Component)	\$31,000
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Component: Chiller 135 ton
Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$115,000
-----		-----
Total (for Component)		\$115,000

Energy Costs: Electricity (base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
1,126,887.0 kWh	\$0.05000	\$56,344	\$0	\$0

Energy Costs: Natural Gas (base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
5,397.0 Therm	\$0.45000	\$2,429		\$0

Life-Cycle Cost Analysis

	Present Value	Annual Value
Initial Capital Costs	\$332,000	\$7,800

Energy Costs

Energy Consumption Costs	\$2,321,590	\$54,544
Energy Demand Charges	\$0	\$0
Energy Utility Rebates	\$0	\$0
	-----	-----
Subtotal (for Energy):	\$2,321,590	\$54,544

Water Usage Costs	\$ 0	\$ 0
Water Disposal Costs	\$ 0	\$ 0

Routine Operating, Maintenance & Repair Costs

Component: AHUs

Routine Annually Recurring Costs	\$22,187	\$521
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Routine Non-Annually Recurring Costs	\$0	\$0
Component: Backup Chiller 90 ton		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Boilers 2x600MBH		
Routine Annually Recurring Costs	\$20,486	\$481
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Chiller 135 ton		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
	-----	-----
Subtotal (for OM&R):	\$76,675	\$1,801
Major Repair and Replacements		
Component: AHUs	\$107,255	\$2,520
Component: Backup Chiller 90 ton	\$90,264	\$2,121
Component: Boilers 2x600MBH	\$33,418	\$785
Component: Chiller 135 ton	\$122,122	\$2,869
	-----	-----
Subtotal (for Repair and Replacements):	\$353,060	\$8,295
Residual Value of Original Capital Components		
Component: AHUs	\$0	\$0
Component: Backup Chiller 90 ton	\$0	\$0
Component: Boilers 2x600MBH	\$0	\$0
Component: Chiller 135 ton	\$0	\$0
	-----	-----
Subtotal (for Residual Value):	\$0	\$0
Residual Value of Major Repair and Replacements		
Component: AHUs	\$0	\$0
Component: Backup Chiller 90 ton	\$0	\$0
Component: Boilers 2x600MBH	-\$13,983	-\$329
Component: Chiller 135 ton	\$0	\$0
	-----	-----
Subtotal (for Residual Value):	-\$13,983	-\$329

Total Life-Cycle Cost

\$3,069,341

\$72,112

Emissions Summary

Energy Name	Annual	Life-Cycle
Electricity:		
CO2	441,648.68 kg	17,664,738.04 kg
SO2	117.66 kg	4,705.88 kg
NOx	190.68 kg	7,626.77 kg
Natural Gas:		
CO2	28,506.91 kg	1,140,198.44 kg
SO2	230.06 kg	9,201.76 kg
NOx	33.60 kg	1,343.82 kg
Total:		
CO2	470,155.59 kg	18,804,936.47 kg
SO2	347.71 kg	13,907.64 kg
NOx	224.28 kg	8,970.59 kg

Alternative: Alt 2

Initial Cost Data (not Discounted)

Initial Capital Costs

(adjusted for price escalation)

Initial Capital Costs for All Components: \$546,800

Component: Copy of: AHUs

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$101,000
-----		-----
Total (for Component)		\$101,000

Component: WTW HP 50ton

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$57,000
-----		-----
Total (for Component)		\$57,000

Component: Backup Boiler

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$15,500

April 1, 2022	100%	\$15,500
<hr/>		
Total (for Component)		\$15,500

Component: Geothermal Wells x60

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$210,000
<hr/>		
Total (for Component)		\$210,000

Component: Chiller 135 ton

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$115,000
<hr/>		
Total (for Component)		\$115,000

Component: WTW HP 40ton

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$48,300
<hr/>		
Total (for Component)		\$48,300

Energy Costs: Electricity

(base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
1,120,498.0 kWh	\$0.05000	\$56,025	\$0	\$0

Energy Costs: Natural Gas

(base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
3,251.0 Therm	\$0.45000	\$1,463	\$0	\$0

Life-Cycle Cost Analysis

	Present Value	Annual Value
Initial Capital Costs	\$546,800	\$12,847

Energy Costs		
Energy Consumption Costs	\$2,270,393	\$53,341
Energy Demand Charges	\$0	\$0
Energy Utility Rebates	\$0	\$0
	-----	-----
Subtotal (for Energy):	\$2,270,393	\$53,341
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Operating, Maintenance & Repair Costs		
Component: Copy of: AHUs		
Routine Annually Recurring Costs	\$22,187	\$521
Routine Non-Annually Recurring Costs	\$0	\$0
Component: WTW HP 50ton		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Backup Boiler		
Routine Annually Recurring Costs	\$20,486	\$481
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Geothermal Wells x60		
Routine Annually Recurring Costs	\$85,006	\$1,997
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Chiller 135 ton		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
Component: WTW HP 40ton		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
	-----	-----
Subtotal (for OM&R):	\$178,682	\$4,198
Major Repair and Replacements		
Component: Copy of: AHUs	\$107,255	\$2,520
Component: WTW HP 50ton	\$60,530	\$1,422
Component: Backup Boiler	\$16,709	\$393
Component: Geothermal Wells x60	\$0	\$0

Component: Chiller 135 ton	\$122,122	\$2,869
Component: WTW HP 40ton	\$51,291	\$1,205

Subtotal (for Repair and Replacements):	\$357,908	\$8,409

Residual Value of Original Capital Components

Component: Copy of: AHUs	\$0	\$0
Component: WTW HP 50ton	\$0	\$0
Component: Backup Boiler	\$0	\$0
Component: Geothermal Wells x60	\$0	\$0
Component: Chiller 135 ton	\$0	\$0
Component: WTW HP 40ton	\$0	\$0

Subtotal (for Residual Value):	\$0	\$0

Residual Value of Major Repair and Replacements

Component: Copy of: AHUs	\$0	\$0
Component: WTW HP 50ton	\$0	\$0
Component: Backup Boiler	-\$6,992	-\$164
Component: Geothermal Wells x60	\$0	\$0
Component: Chiller 135 ton	\$0	\$0
Component: WTW HP 40ton	\$0	\$0

Subtotal (for Residual Value):	-\$6,992	-\$164

Total Life-Cycle Cost	\$3,346,792	\$78,630
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Emissions Summary

Energy Name	Annual	Life-Cycle
Electricity:		
CO2	439,144.71 kg	17,564,586.02 kg
SO2	116.99 kg	4,679.20 kg
NOx	189.60 kg	7,583.53 kg
Natural Gas:		
CO2	17,171.76 kg	686,823.26 kg
SO2	138.58 kg	5,542.88 kg
NOx	20.24 kg	809.48 kg

Total:

CO2	456,316.46 kg	18,251,409.27 kg
SO2	255.57 kg	10,222.08 kg
NOx	209.84 kg	8,393.01 kg

Alternative: Alt 3

Initial Cost Data (not Discounted)

Initial Capital Costs

(adjusted for price escalation)

Initial Capital Costs for All Components: \$583,525

Component: Water to Air Heat Pumps 13x3Ton

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$53,325
-----		-----
Total (for Component)		\$53,325

Component: Dedicated Outdoor Air System

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$18,700
-----		-----
Total (for Component)		\$18,700

Component: Backup Boiler

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$15,500
-----		-----
Total (for Component)		\$15,500

Component: Copy of: Geothermal Wells x60

Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$210,000
-----		-----
Total (for Component)		\$210,000

Component: Water to Air Heat Pumps 50Ton

Cost-Phasing

Date	Portion	Yearly Cost
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Date	Portion	Yearly Cost
April 1, 2022	100%	\$171,000

Total (for Component)		\$171,000

Component: Copy of: Chiller
Cost-Phasing

Date	Portion	Yearly Cost
April 1, 2022	100%	\$115,000

Total (for Component)		\$115,000

Energy Costs: Electricity
(base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
1,087,850.0 kWh	\$0.05000	\$54,392	\$0	\$0

Energy Costs: Natural Gas
(base-year dollars)

Average		Average	Average	Average
Annual Usage	Price/Unit	Annual Cost	Annual Demand	Annual Rebate
37.0 Therm	\$0.45000	\$17	\$0	\$0

Life-Cycle Cost Analysis

	Present Value	Annual Value
Initial Capital Costs	\$583,525	\$13,709
Energy Costs		
Energy Consumption Costs	\$2,148,158	\$50,469
Energy Demand Charges	\$0	\$0
Energy Utility Rebates	\$0	\$0

Subtotal (for Energy):	\$2,148,158	\$50,469
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0

Routine Operating, Maintenance & Repair Costs

Component: Water to Air Heat Pumps 13x3Ton

Component: Water to Air Heat Pumps 13x3Ton		
Routine Annually Recurring Costs	\$80,755	\$1,897
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Dedicated Outdoor Air System		
Routine Annually Recurring Costs	\$21,251	\$499
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Backup Boiler		
Routine Annually Recurring Costs	\$10,243	\$241
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Copy of: Geothermal Wells x60		
Routine Annually Recurring Costs	\$85,006	\$1,997
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Water to Air Heat Pumps 50Ton		
Routine Annually Recurring Costs	\$170,012	\$3,994
Routine Non-Annually Recurring Costs	\$0	\$0
Component: Copy of: Chiller		
Routine Annually Recurring Costs	\$17,001	\$399
Routine Non-Annually Recurring Costs	\$0	\$0
	-----	-----
Subtotal (for OM&R):	\$384,269	\$9,028

Major Repair and Replacements

Component: Water to Air Heat Pumps 13x3Ton	\$116,232	\$2,731
Component: Dedicated Outdoor Air System	\$19,858	\$467
Component: Backup Boiler	\$124,509	\$2,925
Component: Copy of: Geothermal Wells x60	\$0	\$0
Component: Water to Air Heat Pumps 50Ton	\$372,728	\$8,757
Component: Copy of: Chiller	\$122,122	\$2,869
	-----	-----
Subtotal (for Repair and Replacements):	\$755,450	\$17,749

Residual Value of Original Capital Components

Component: Water to Air Heat Pumps 13x3Ton	\$0	\$0
Component: Dedicated Outdoor Air System	\$0	\$0
Component: Backup Boiler	\$0	\$0
Component: Copy of: Geothermal Wells x60	\$0	\$0
Component: Water to Air Heat Pumps 50Ton	\$0	\$0
Component: Copy of: Chiller	\$0	\$0

Subtotal (for Residual Value):	\$0	\$0
Residual Value of Major Repair and Replacements		
Component: Water to Air Heat Pumps 13x3Ton	-\$57,127	-\$1,342
Component: Dedicated Outdoor Air System	\$0	\$0
Component: Backup Boiler	-\$52,099	-\$1,224
Component: Copy of: Geothermal Wells x60	\$0	\$0
Component: Water to Air Heat Pumps 50Ton	-\$183,193	-\$4,304
Component: Copy of: Chiller	\$0	\$0
Subtotal (for Residual Value):	-\$292,420	-\$6,870
Total Life-Cycle Cost	\$3,578,982	\$84,085

Emissions Summary

Energy Name	Annual	Life-Cycle
Electricity:		
CO2	426,349.33 kg	17,052,805.89 kg
SO2	113.58 kg	4,542.86 kg
NOx	184.08 kg	7,362.57 kg
Natural Gas:		
CO2	195.43 kg	7,816.81 kg
SO2	1.58 kg	63.08 kg
NOx	0.23 kg	9.21 kg
Total:		
CO2	426,544.76 kg	17,060,622.71 kg
SO2	115.16 kg	4,605.95 kg
NOx	184.31 kg	7,371.78 kg

NIST BLCC 5.3-22: Lowest LCC

Consistent with Federal Life Cycle Cost Methodology in OMB Circular A-94

General Information

File Name:	C:\Users\g6edxtw9\Desktop\Fosmer LCCA\New Folder\LCCA.xml
Date of Study:	Thu Nov 10 12:43:01 CST 2022
Analysis Type:	MILCON Analysis, Non-Energy Project
Project Name:	DRP
Project Location:	North Dakota
Analyst:	C. Fosmer
Base Date:	April 1, 2022
Beneficial Occupancy Date:	April 1, 2022
Study Period:	40 years 0 months (April 1, 2022 through March 31, 2062)
Discount Rate:	-0.3%
Discounting Convention:	Mid-Year

Lowest LCC

Comparative Present-Value Costs of Alternatives (Shown in Ascending Order of Initial Cost, * = Lowest LCC)

Alternative	Initial Cost (PV)	Life Cycle Cost (PV)
Alt 1.	\$332,000	\$3,069,341 *
Alt 2	\$546,800	\$3,346,792
Alt 3	\$583,525	\$3,578,982

NIST BLCC 5.3-22: Summary LCC

Consistent with Federal Life Cycle Cost Methodology in OMB Circular A-94

General Information

File Name:	C:\Users\g6edxtw9\Desktop\Fosmer LCCA\New Folder\LCCA.xml
Date of Study:	Thu Nov 10 12:42:43 CST 2022
Analysis Type:	MILCON Analysis, Non-Energy Project
Project Name:	DRP
Project Location:	North Dakota
Analyst:	C. Fosmer
Base Date:	April 1, 2022
Beneficial Occupancy Date:	April 1, 2022
Study Period:	40 years 0 months (April 1, 2022 through March 31, 2062)
Discount Rate:	-0.3%
Discounting Convention:	Mid-Year

Discount and Escalation Rates are REAL (exclusive of general inflation)

Alternative: Alt 1. LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$332,000	\$7,800
Energy Consumption Costs	\$2,321,590	\$54,544
Energy Demand Costs	\$0	\$0
Energy Utility Rebates	\$0	\$0
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Annually Recurring OM&R Costs	\$76,675	\$1,801
Routine Non-Annually Recurring OM&R Costs	\$0	\$0
Major Repair and Replacement Costs	\$353,060	\$8,295
Less Remaining Value	-\$13,983	-\$329
	-----	-----
Total Life-Cycle Cost	\$3,069,341	\$72,112

Alternative: Alt 2 LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$546,800	\$12,847
Energy Consumption Costs	\$2,270,393	\$53,341
Energy Demand Costs	\$0	\$0

Energy Utility Rebates	\$0	\$0
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Annually Recurring OM&R Costs	\$178,682	\$4,198
Routine Non-Annually Recurring OM&R Costs	\$0	\$0
Major Repair and Replacement Costs	\$357,908	\$8,409
Less Remaining Value	−\$6,992	−\$164
	-----	-----
Total Life-Cycle Cost	\$3,346,792	\$78,630

Alternative: Alt 3

LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$583,525	\$13,709
Energy Consumption Costs	\$2,148,158	\$50,469
Energy Demand Costs	\$0	\$0
Energy Utility Rebates	\$0	\$0
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Annually Recurring OM&R Costs	\$384,269	\$9,028
Routine Non-Annually Recurring OM&R Costs	\$0	\$0
Major Repair and Replacement Costs	\$755,450	\$17,749
Less Remaining Value	−\$292,420	−\$6,870
	-----	-----
Total Life-Cycle Cost	\$3,578,982	\$84,085

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

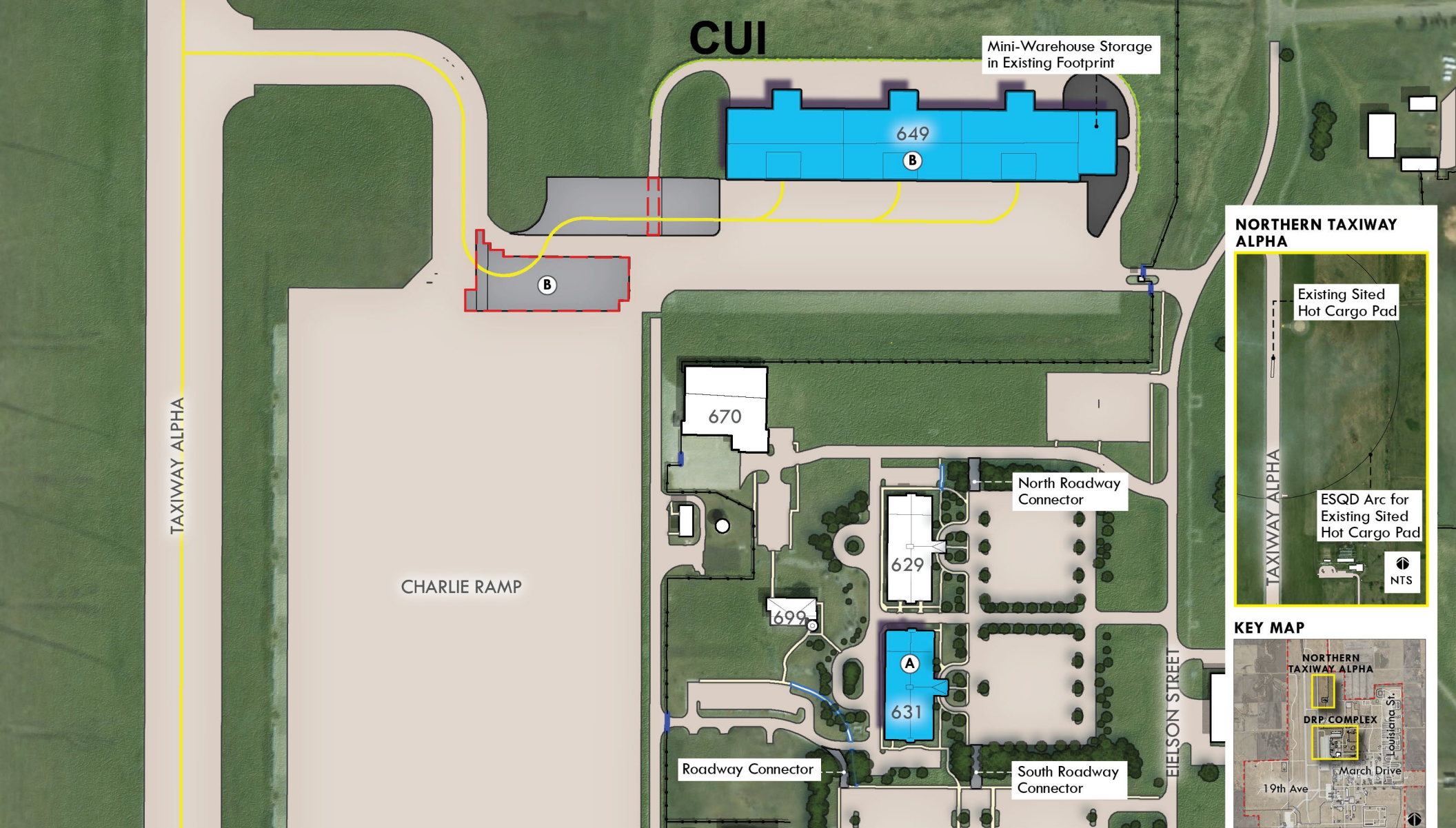
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APPENDIX F GRAND FORKS AREA DEVELOPMENT PLAN



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GRAND FORKS AIR FORCE BASE DRP COMPLEX- PREFERRED ALTERNATIVE PHASE ONE

0 150 300 Feet

LEGEND

Existing Fence Lines	Existing Pavement
Proposed Fences	Proposed Buildings
Demo Pavement	Renovated Buildings
Aircraft Taxi and Tow Lines	Proposed Sidewalks
Entry Control Points	Proposed Asphalt
Existing Buildings	Proposed Concrete
Existing Sidewalks	

PROJECT LIST

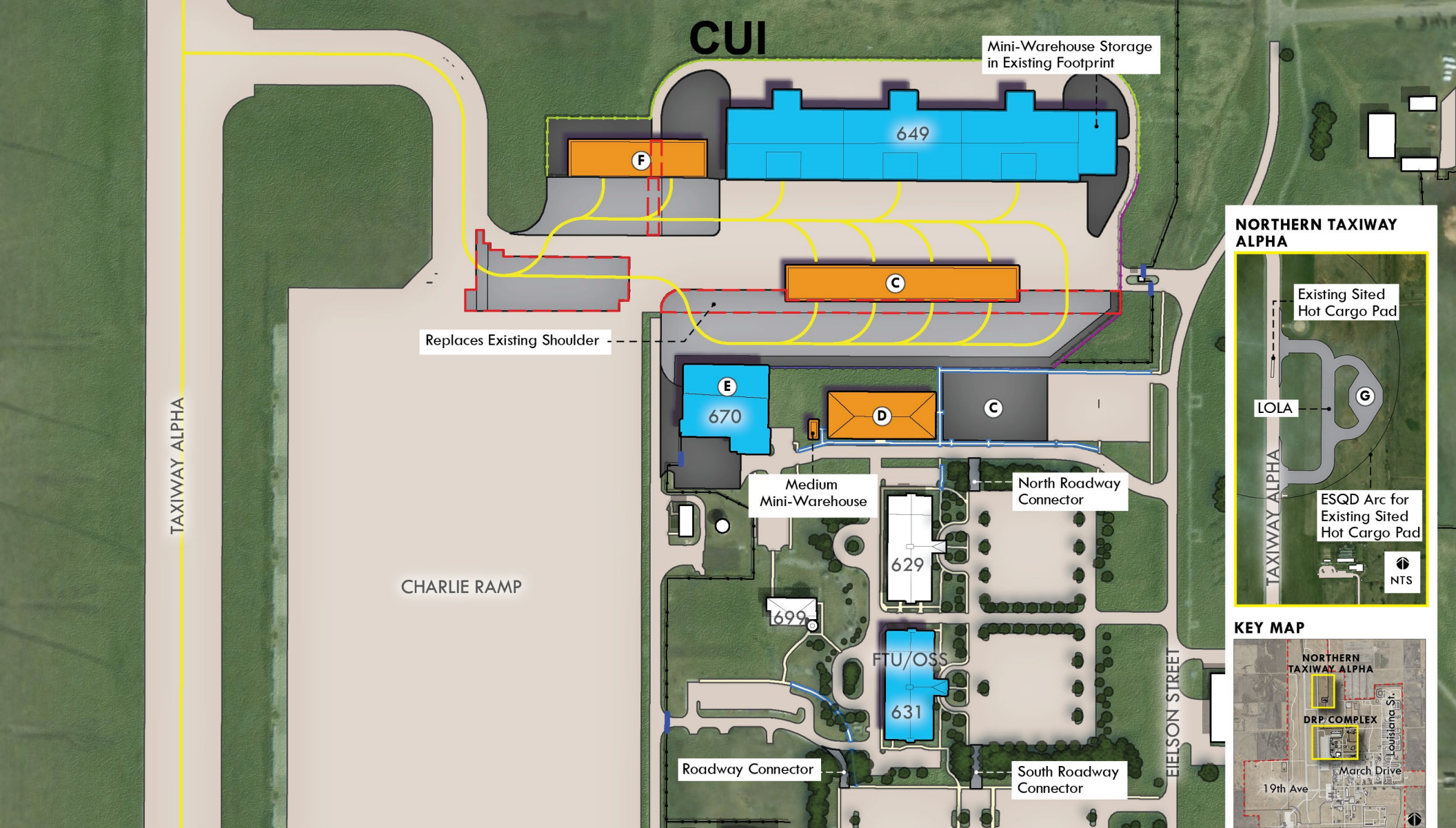
- (A) Renovate Building 631 for Combined FTU/OSS
- (B) Renovate Building 649, Rehab Pavement Section, and Add New Asphalt

PROJECTS NOT SHOWN

- Hazardous Material Storage Building (POL Storage)
- Corrosion Control Utility Storage Building
- Two GDT Antenna Pads
- Arresting Gear Pads

Note: all projects include adjacent storage facilities and apron rehabilitation

CUI



GRAND FORKS AIR FORCE BASE DRP COMPLEX- PREFERRED ALTERNATIVE PHASE TWO

LEGEND

Existing Fence Lines	Existing Buildings
Proposed Fences	Existing Sidewalks
Obscuration Fence	Existing Pavement
Jet Blast Deflector	Proposed Buildings
Demo Pavement	Renovated Buildings
Aircraft Taxi and Tow Lines	Proposed Sidewalks
Entry Control Points	Proposed Asphalt
	Proposed Concrete

PROJECT LIST

- (C) Construct Aircraft Operations Facility, Access Apron, and POV Parking
- (D) Construct New Squad Ops Facility
- (E) Renovate Building 670 Logistics Warehouse
- (F) Construct Heavy Maintenance Hangar
- (G) Construction of Live Ordinance Loading Area

PROJECTS NOT SHOWN

- Hazardous Material Storage Building (POL Storage)
- Corrosion Control Utility Storage Building
- Two GDT Antenna Pads
- Arresting Gear Pads

Note: all projects include adjacent storage facilities and apron rehabilitation

CUI

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX G ELECTRICAL



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Scott, Nicholas W CIV USARMY CENWO (USA)

From: Steve C. Breidenbach <sbreidenbach@nodakelectric.com>
Sent: Friday, April 22, 2022 2:18 PM
To: Scott, Nicholas W CIV USARMY CENWO (USA); CASSANELLI, MELISSA GS-12 USAF ACC 319 CES/CEOER
Subject: [Non-DoD Source] Option for power feeds to DRP Campus
Attachments: Option 1.docx; Option 2.docx

Nick, Melissa

Attached are the options for the power feeds to DRP campus. The white line on the attached docs indicates a rough route for the new feeders.

Transformer costs were not included in the est. because of the uncertainty of sizes needed.

Below are costs based on sizes needed at the new bldg..

300kVA	\$20,800
500kVA	\$24,850
1000kVA	\$38,345
1500kVA	\$44,960

Please let me know if you have any questions.

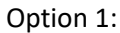
Thanks,

Steve Breidenbach

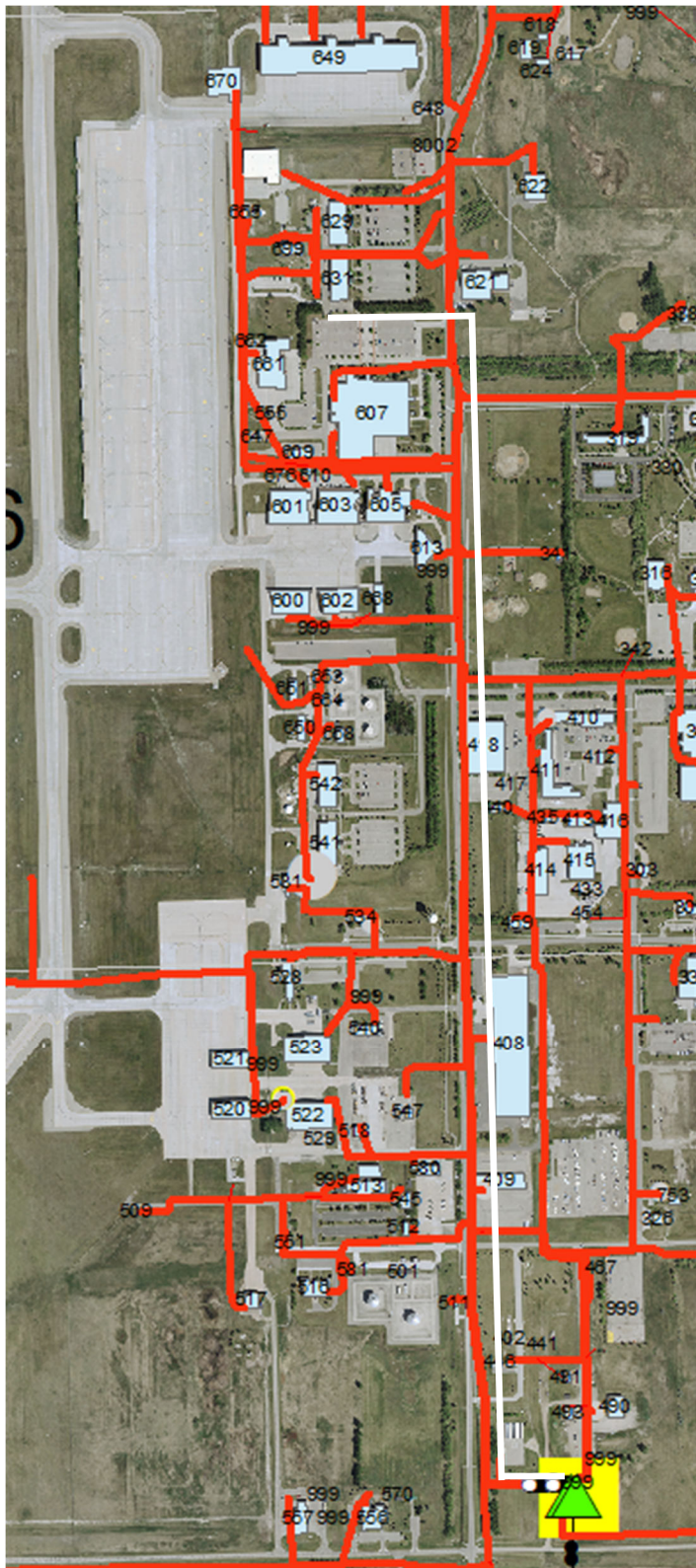
Engineering Manager



4000 32nd Ave S
Grand Forks, ND 58208-3000
Direct: (701) 795-6759
Cell: (701) 741-3969
Fax: (701) 795-6701
sbreidenbach@nodakelectric.com



- a. Currently the Eielson substation only provides power to the housing area. The substation transformer located at Eielson is not rated high enough to deliver power to the housing plus the mission buildings. The substation capacity only has about 2-3 MW available to pick-up load in situations of emergencies. Nodak would up-grade the substation to a 10 MW transformer that would be capable to carry the entire base load. Nodak would also run a 750MCM feeder from the substation to a tie-in at Bldg. 631. We would also add switches to link both feeder 2 and feeder 8 from Steen substation. Capacity of this line would be approx.. 10MW. This option provides the base distribution system with resiliency for the whole base...Est. total cost ... \$1,120,000 (Transformers where not included in the cost for new bldgs.)



Option 2:

Steen substation feeder addition

- a. Nodak would add an additional feeder to Steen substation and install a feeder from Steen sub to Bldg 631. This feed would also have the capacity of 10MW. It would be tied into both feeders 2 and 8 just as option 1 provides... Est. total Cost ...\$600,000 (Transformers for the new bldgs. were not included in cost)

SIMPLIFIED RISK ASSESSMENT CALCULATION

Lightning Protection Risk Assessment
Per NFPA 780, Annex L6.4
2017 Edition

SUMMARY

Risk Assessment:

If $N_d \leq N_c$, then Lightning Protection System can be optional.

If $N_d > N_c$, then Lightning Protection System should be installed.

$N_d =$ 0.07380

$N_c =$ 0.0006

Recommendation:

LIGHTNING PROTECTION SYSTEM SHOULD BE INSTALLED ON THE CONSOLIDATED
HELO/TRF OPERATIONS/AMU AND ALERT FACILITY.

A. Lightning Flash Density

Index "Ng"

<https://interactive-lightning-map.vaisala.com/>

Average US lightning flash density in flashes/km²/year

Index "Ng" = 16.1

B. Equivalent Collective Area

Index "Ae"

$A_{e1} = LW + 6H(L+W) + 3.14159(9)(H^2)$ for rectangular structures

$A_{e2} = 3.14159(9)(H^2)$ for a structure where a prominent part encompasses
all portions of a lower part

$A_{e3} = 3.14159(9)(H^2) + LW + 6H(L+W) + 3.14159(9)(H_2^2)$ is an
alternative calculation for a structure where a
prominent part encompasses all portions of a lower
part

	FEET	METERS	KILOMETERS
L =	239	72.8472	0.072847
W =	102	31.0896	0.03109
H =	50	15.24	0.01524
H ₂ =	40	12.192	0.012192
Ae ₁ =	18335.6947 square-meters		
	0.0183 square-kilometers		
Ae ₂ =	6566.9234 square-meters		
	0.0066 square-kilometers		
Ae ₃ =	22538.5256 square-meters		
	0.0225 square-kilometers		

C. Determination of Environmental Coefficient

Index "C₁"

Location	Index Value
Structure located within a space containing structures or trees of the same height or taller within a distance of 3H	0.25
Structure surrounded by smaller structures located within a distance of 3H	0.50
Isolated structure, no other structures located within Distance of 3H	1.00
Isolated structure on a hilltop	2.00

Index "C₁" =

0.25

D. Expected Lightning Stroke Frequency to the Structure

Index “Nd”

$$Nd = (Ng)(Ae)(C_1)$$

Use Ae that is in square-km

$$Ae_1 = \quad Nd = 0.07380$$

$$Ae_2 = \quad Nd = 0.02643$$

$$Ae_3 = \quad Nd = 0.09072$$

E. Determination of Structural CoefficientIndex “C₂”

Structural Framework	Roof Type		
	<i>Metal</i>	<i>Nonmetallic</i>	<i>Flammable</i>
Metal	0.5	1.0	2.0
Nonmetallic	1.0	1.0	2.5
Flammable	1.0	2.5	3.0

$$\text{Index “C}_2\text{”} = 0.5$$

F. Determination of Structure Contents CoefficientIndex “C₃”

Low value and nonflammable	0.5
Standard value and nonflammable	1.0
High value, moderate flammability	2.0
Exceptional value, flammable, computer or electronics	3.0
Exceptional value, irreplaceable cultural items	4.0

$$\text{Index “C}_3\text{”} = 1$$

G. Determination of Structure Occupancy CoefficientIndex “C₄”

Unoccupied	0.5
Normally occupied	1.0
Difficult to evacuate or risk of panic	3.0

Index “C₄” =

1

H. Determination of Lightning Consequence CoefficientIndex “C₅”

Continuity of facility services not required, no environmental impact	1.0
Continuity of facility services required, no environmental impact	5.0
Consequences to the environment	10.0

Index “C₅” =

5

I. Tolerable Lightning to StructureIndex “N_c”

$$N_c = 0.0015/C$$

$$C = (C_2)(C_3)(C_4)(C_5)$$

C =

2.5

N_c =

0.0006

Nellis Design		
Area Description	Square Feet	Power (Watts)
SIM Area	13500	675,000
Part A	17500	262,500
Part B	22750	341,250
	Total	1,278,750

Building 631 Design		
Area Description	Square Feet	Power (Watts)
SIM Area	6250	312,500
1st Floor	20000	300,000
2nd Floor	16000	240,000
	Total	852,500

Tier 2 Vs Tier 4 Generator

Description	Tier 2	Tier 4
Runtime Per Year (EPA Restriction)	*100 Hours	None
Cost	\$420K	\$640K

*Can exceed 100 hrs during an emergency (must be reported)

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SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

**APPENDIX H
FACILITY ICD ANNEX A**



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Ground to Facility ICD – Annex A

Document Number: 420B5518A

Revision: DRAFT R.2

Date: February 16, 2023

Ground to Facility ICD – Annex A

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DRAFT

REVISION HISTORY

The following table identifies each version or issue of this document and provides a description of the purpose or reason for the change. Performing a document comparison between any two versions of this document can identify detailed change differences.

Revision	Document Date	Description of Change	Originator
DRAFT	10-Oct-2022	Initial creation	Brandon Skinner
DRAFT R.1	6-Jan-2023	Incorporated changes from ACE review of the draft	Brandon Skinner
DRAFT R.2	16-Feb-2023	Incorporated changes from second round of reviews and adapted to having the new Annex B that accompanies this document	Brandon Skinner

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1. Purpose

The purpose of this annex is to provide technical specification and general requirements and guidance for the rooms and stations associated with the Operating Areas and Sim owned/shared portions of the Joint Use Area (JUA). The intended audience is the facility construction contractors.

2. Applicable Documents

The following table lists the applicable documents.

Table 1: Applicable Documents

Document Number	Revision	Title

3. Technical Specifications

3.1 General Guidance

This document defines the technical specifications for the Joint Use Area (JUA) and the Operations Areas (OA). For the purposes of these specifications, these areas are separate but similar in implementation.

Each area must be able to be maintained without interrupting another area or the facility as a whole. This leads to each area requiring its own Uninterruptable Power Source (UPS) and ability to isolate HVAC components to perform maintenance without taking the whole facility down. The server room for each area makes a convenient home run location for the areas cabling in addition to a central location to install the UPS.

For routing data cable from the server room to the rooms within the same area a common Raised Access Floor (RAF) and drop ceiling shall be used. In rooms where Sound Transmissivity Class (STC) ratings require that the walls go true floor to true ceiling, penetrations through the wall used to pass cable trays through is expected. The general guidance for cable routing is that all sim system network cabling within an OA is contained within the RAF and the facility cabling is in the drop ceiling as show in Figure 1. Conduits linking the Network Comm Room and the OA Server Rooms to other rooms should be run through the drop ceiling cavity. If a data cable conduit crosses into an unsecured area or goes into a separately compartmented area, a Protected Distribution System (PDS) is required.

The facility contractor should determine the power cable routing for each area.

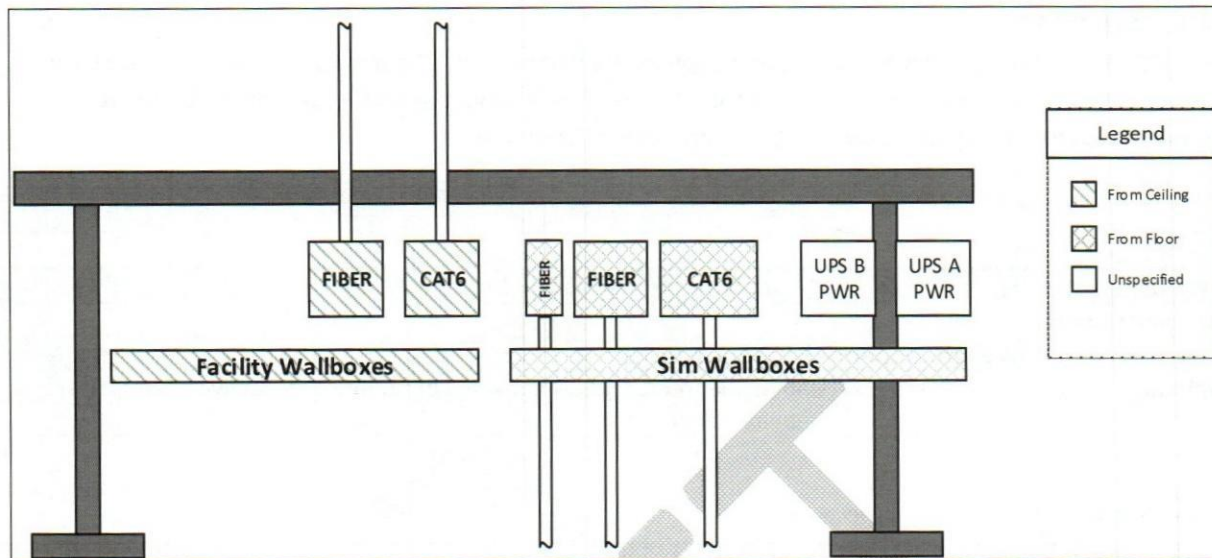


Figure 1 - Wall Box Installation Example

3.2 Operations Area

The Operations Area (OA) is a collection of rooms that operate together with a common server room.

Table 2 - Operations Area Top Level Specifications

Area Specifications	
Under Floor Access	<ul style="list-style-type: none"> Common RAF with pre-installed ladder rack and cable trays to allow connectivity from server room to all racks and workstation locations within the OA. Cable trays for fiber shall have a solid bottom
Cooling	<ul style="list-style-type: none"> The cooling to an OA shall be a minimum of n+1 redundant and allow it to be shutoff for maintenance without impacting the JUA or any other OA.
Power Feeds	<ul style="list-style-type: none"> The power feeding the OA shall be on a generator All UPS power shall be fed from the UPS within the OA server room The UPS shall be sized to accommodate the OA not just the server room
Total Estimated Power on UPS(w)	95,991 (no margins)
Facility Network Connectivity	All stations get the following connections unless otherwise specified: 4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)

3.2.1 Sim Room

The Sim Room contains 2 sim workstations and a sound attenuating rack. The sim workstations and chairs are Government Furnished Government Installed (GFGI). The sound attenuating rack is Contractor Furnished Contractor Installed (CFCI) detailed in the Bill of Materials in Table 6.

Table 3 - Sim Room Specifications

Room Specifications	
Minimum Room Size	16' 6" x 9' 6"
Nominal Occupants	2
Total Estimated Power on UPS(w)	3,400 (no margins)
Lighting	Dimmable (threshold), Dimmable Spot Lighting (objective); See special requirements

Table 4 - Sim Room Datasheet Recommendations

Room Datasheet Recommendations	
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler; Recessed Head
Lighting	Recessed; Emergency Lighting
Power	Generator; UPS
Special Requirements	UPS from OA Server Room; Dimmable zero flicker warm white lights in color region of 3000K.

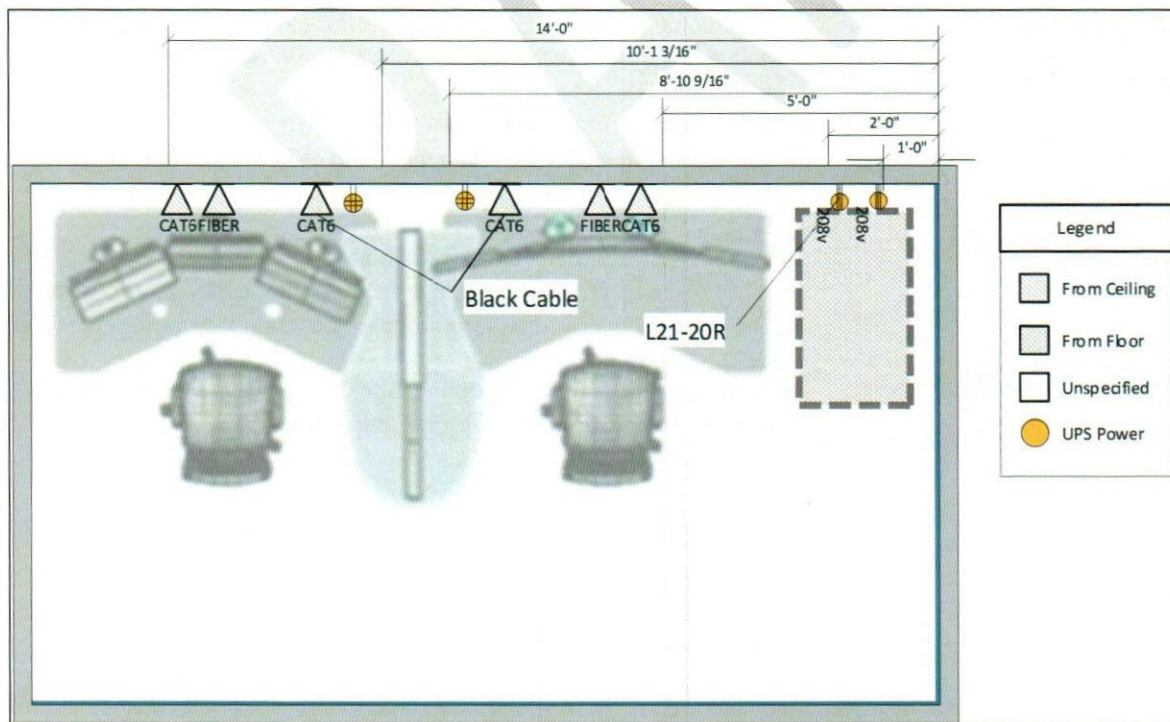


Figure 2 - Sim Room UPS Power and Data Locations

3.2.1.1 Sim Station

Table 5 - Sim Station Specifications

Station Specifications (Each)	
Dimensions (LxW)	6' 5" x 5' 5"
Power Consumption (w)	See section 3.2.1.2 – Rack is primary power source
Power Connectivity	1 x 5-15R Quad on UPS A and 1 x 5-15R Quad on UPS B
Facility Network Connectivity	4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)
Sim Network Connectivity	2 x CAT6 F/UTP (Black); Remaining connections are handled within the rack as specified in Table 6.

3.2.1.2 Sound Attenuating Rack

The sound attenuating rack, also known as the "Hush Rack" is located along the wall just inside the door to each sim room as shown in Figure 3. The simulator stations, installed within the same room, receive their power from this rack's Power Distribution Units (PDU). All sim networking, with the exception of the black cables, terminate in this rack at the locations specified in Figure 4.

This rack is cooled by the room's ambient air and has ducts that tie into the HVAC plenum for the room. This is specified in Figure 3. The rack must be able to move back and forth a little so leaving about 12" of extra duct on the flexible duct is desired. The pressure created within the ducts is enough to expand the flexible duct so too much extra duct is undesirable. Big rack movements will require the ducts to be disconnected from the rack.

Since these racks will contain hardware that could put off smoke under a failure, some sort detection and mitigation system is desired to minimize the effects of a failure event on the rest of the area covered by the same HVAC unit.

Table 6 - Sound Attenuating Rack Specifications

Station Specifications	
Dimensions (HxWxD)	80.87" x 30.7" x 47.6"
Power Consumption (w)	3254
Power Connectivity	2 x L21-20R
Sim Network Connectivity	6 x CAT6 F/UTP Yellow, 10 x CAT6 F/UTP Red, 16 x CAT6 F/UTP Purple, 12 x CAT6 F/UTP Gray, 3 x MPO-24 Trunk with LC modules, 1 x MPO-24 Trunk Green with LC Module
Cooling	Feed: Ambient; Return: 2 x 6" Round Flexible Duct
Bill of Material	1 x UCoustic E3B-4211-15 (Rack) 1 x UCoustic E3B-DS-AF (Exhaust Duct Kit) 1 x UCoustic E3B-4230-CT-AF (Cable Tray) 1 x UCoustic E3B-42-CM-AF (Cable Management Fingers) 3 x UCoustic EXX-CE-AA (Foam Cable Entry Blocks)** 1 x UCoustic E3B-PK-AA (Fixed Plinth Kit)** ** These parts will be installed by the government. Please leave in the bottom of each rack.

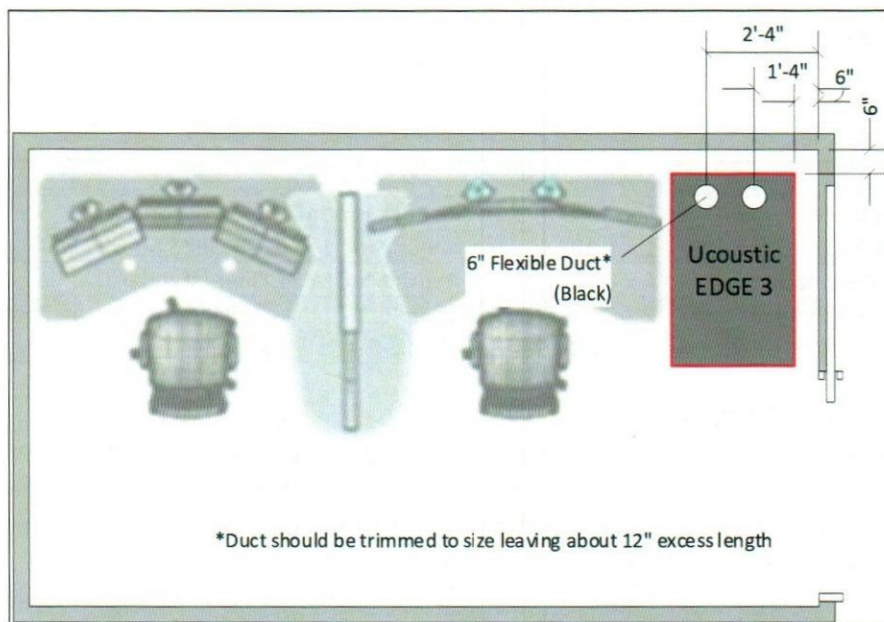


Figure 3 - Sim Room Rack Installation

The exact location of the duct penetration into the ceiling cavity is dependent on the drop ceiling design. These penetrations should be made within a 6" tolerance of the specified location in Figure 3, aligned evenly with the ceiling tiles. The connections are made with 6" flexible ducting so precision is not required.



Ground to Facility ICD Annex A

3.2.2 Support Room

The room requirements are based on having 6 support stations per support room and an auxiliary station location specified later in this section. There is a seventh location within this room that is a standard office space. This room will also have a display on each wall, a white board, GSA safes with X10 locks, an NSA approved paper shredder, a mission planning table, and a minimum of 3 printers that are all part of Furniture, Fixtures, and Equipment (FF&E) with locations and final quantities dependent upon user's needs and space availability.

Table 7 - Support Room Specifications

Room Specifications	
Minimum Room Size	26' x 19'
Nominal Occupants	6
Total Estimated Power on UPS(w)	5,260 (no margins)
Power Phasing	All support stations shall be distributed evenly across 3 phases of power with no more than 2 stations on a single circuit.
Printer Power	1 x 5-15R on dedicated circuit per printer
Sim Network Connectivity	1 x CAT6 F/UTP (Gray), 1 x CAT6 F/UTP (Yellow), 1 x CAT6 F/UTP (Red)
Secure Storage	2 x 4 drawer safe with X10 dials
Wall Display Power	1 x 5-15R Dual on UPS (stagger UPS and phasing)
Wall Display Connectivity	2 x OM-3+ LC fiber (standard)

Table 8 - Support Room Datasheet Recommendations

Room Datasheet Recommendations	
Fire Detection	Smoke Detection
Fire Suppression	Wet pipe sprinkler
Lighting	Recessed; Emergency Lighting
Smoke Exhaustion	None
Flooring	Luxury Vinyl Tile (RAF)
Special Requirements	UPS from OA Server Room; Dimmable zero flicker warm white lights in color region of 3000K.

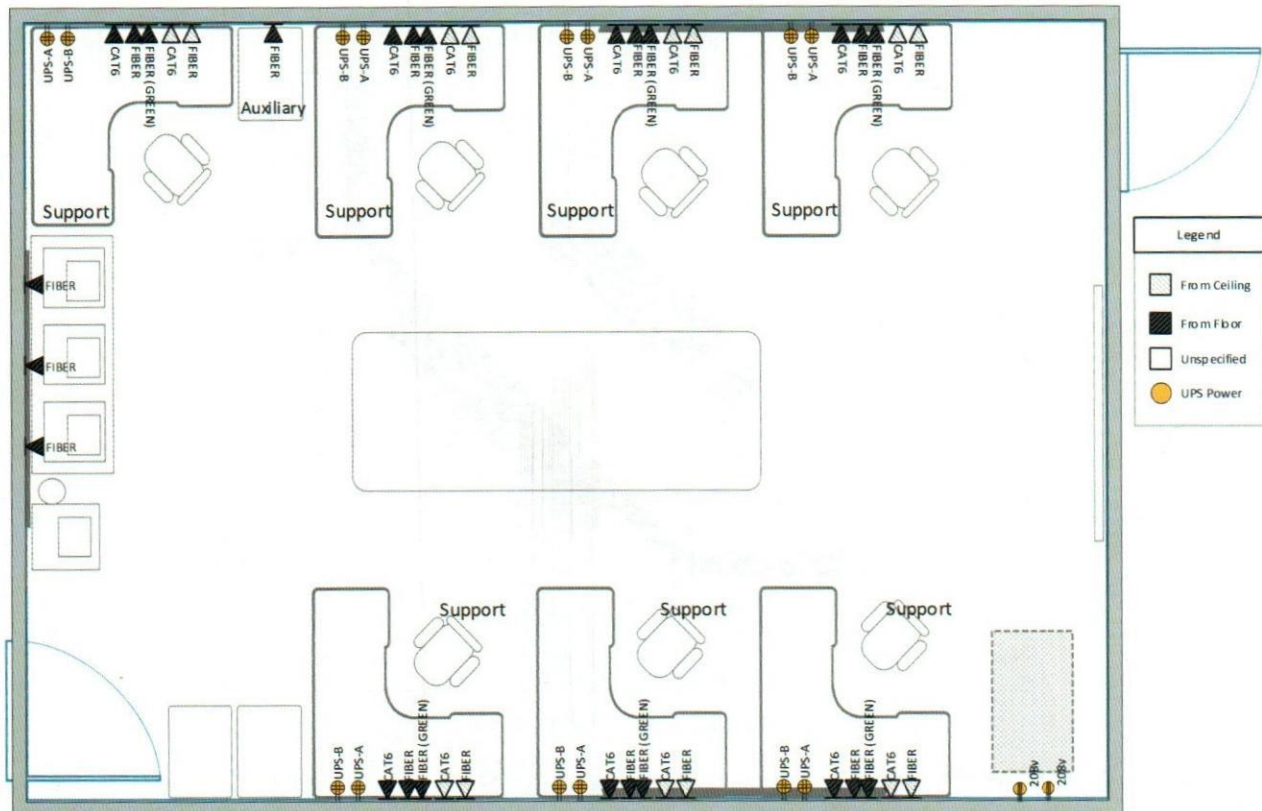


Figure 5 - Support Room Planning Diagram

3.2.2.1 Support Station

The support station is a sit/stand station that fits within the specified location in Figure 5. These stations are GFGI with the power and connectivity being CFCL.

Table 9 - Support Station Specifications

Station Specifications	
Dimensions (LxW)	5' x 5'
Power Consumption (w)	760
Power Connectivity	1 x 5-15R Quad on UPS A and 1 x 5-15R Quad on UPS B
Facility Network Connectivity	4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)
Sim Network Connectivity	2 x CAT6 F/UTP (Yellow), 4 x CAT6 F/UTP (Red), 4 x CAT6 F/UTP (Gray), 8 x OM-3+ LC (Standard), 2 x OM-3+ LC (Green) *Network color shall be indicated on the wall box

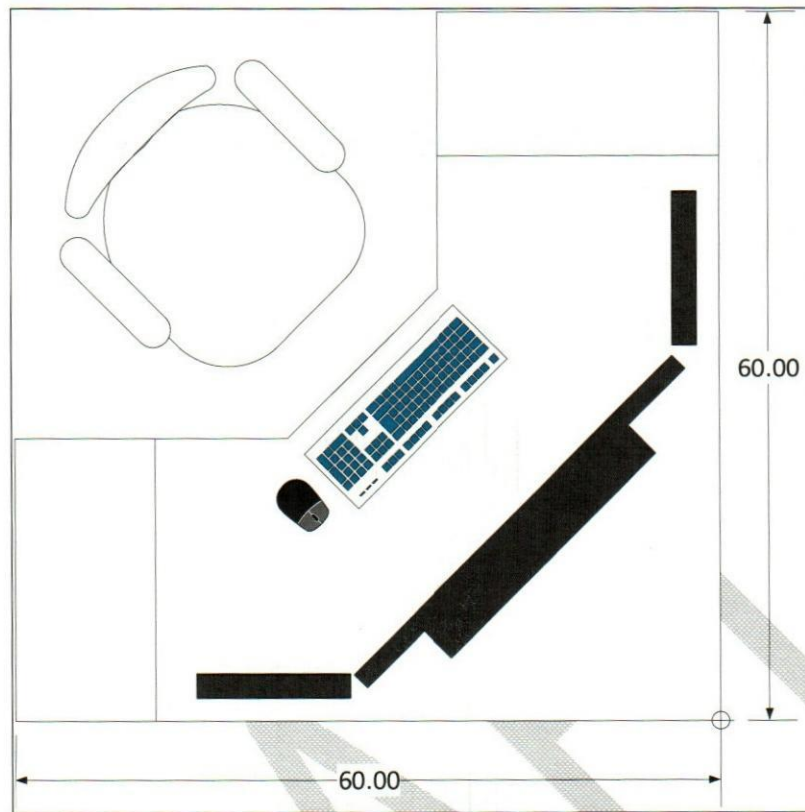


Figure 6 - Support Station Layout

The perspective of is from the back of the desk looking to toward the seat where a user would sit. See the origin point compared to the origin point in Figure 6.

3.2.2.2 Auxiliary Station

This station is a table top or ground standing cabinet with a table top that can hold a piece of equipment. It does not have a user presence and is excluded from the blanket facility connectivity.

Table 10 - Support Auxiliary Station Specifications

Station Specifications	
Minimum Dimensions (LxW)	3' x 3'
Power Consumption (w)	300
Power Connectivity	1 x 5-15R Dual on UPS A and 1 x 5-15R Dual on UPS B
Facility Network Connectivity	N/A
Sim Network Connectivity	6 x OM3+ LC (Standard)

3.2.3 OA Server Room

This server room provides connectivity and processing for the OA. It is the intent to have all connectivity to/from the OA route through this room. In addition, it is expected that the power panels feeding the OAs be contained within this room.

Table 11 - OA Server Room Specifications

Room Specifications	
Minimum Room Size	15' x 49.5'
Nominal Occupants	0
Total Estimated Power on UPS(w)	68,471 (no margins)
Environmental	Hot aisle containment allowing for heterogeneous racks, e.g. Vertiv Aisle Containment System pre-installed with blanking panels for all rack locations
Electrical	OA electrical panels within this room
Backup Power	2n with a minimum of 30 minutes powering backup power panels for the rest of the OA
Facility Network Connectivity	4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (Standard)
Sim Network Connectivity	Connectivity to the JUA Server Room: 7 x MPO-24 Trunks (Standard); 2 x MPO-24 Trunks (Green if possible) *Connectivity to rooms and stations are defined by the respective rooms and/or stations.
Intended Rack Model	TrippLite SR45UBDP - 45U Deep Rack

Table 12 - OA Server Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Chilled Water; Hot Aisle Isolation; In-Row Chillers
Fire Detection	Early Detection
Fire Suppression	Clean agent; Wet Pipe Sprinkler; High Temp Heads (200F); Recessed
Lighting	Recessed; Emergency Lighting
Power	Generator; UPS
Special Requirements	Manual Smoke Exhaustion; 2N 30-Min UPS feeding the OA rooms as applicable

3.2.3.1 OA Server Room Racks

This table shows the current size, weight, and power estimates for each rack within the OA Server Rooms.

Rack Id	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
B21	83.75 x 23.63 x 48.5	2300	2 x L21-20R	831
B22	83.75 x 23.63 x 48.5	3540	2 x L21-20R	980
B23	83.75 x 23.63 x 48.5	4905	2 x L21-20R	1314
B24	83.75 x 23.63 x 48.5	3915	2 x L21-20R	1063
B25	83.75 x 23.63 x 48.5	2705	2 x L21-20R	868
B26	83.75 x 23.63 x 48.5	4476	2 x L21-20R	1090
B27	83.75 x 23.63 x 48.5	1130	2 x L21-20R	570
B28	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B29	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B30	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B31	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B32	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B33	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B34	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B35	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B36	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B37	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B38	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B39	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B40	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

Table 13 - OA Server Rack Specifications

3.2.3.2 OA Server Room Layout

The following layout is provided to show the rack numbering which is necessary for identifying the location for the CFCI patch racks and the rack where the antenna farm will terminate in. The locations of the aisles are for guidance when designing the final layout of this room. It is understood that the selected UPS system, chillers, and hot aisle equipment will impact the final layout.

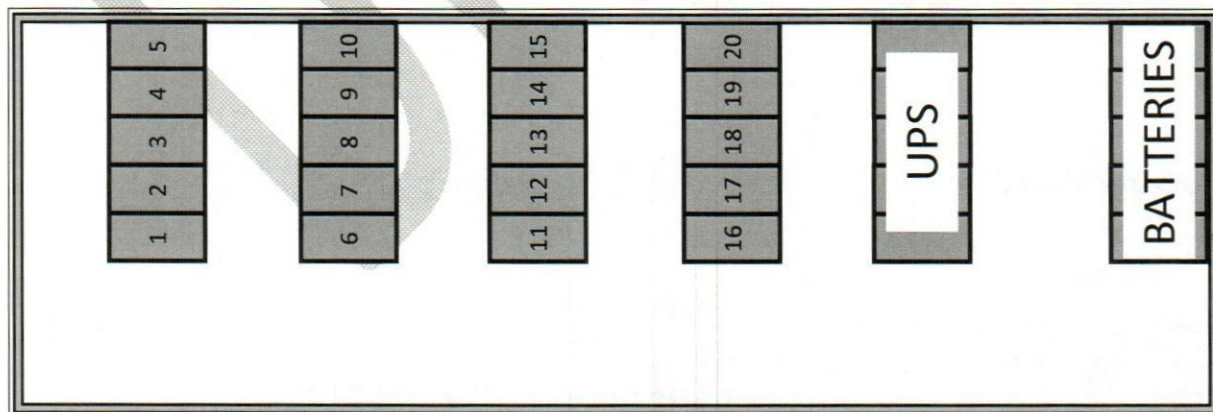


Figure 7 - OA Server Room Rack Numbering

3.2.3.3 OA Server Room Classified Fiber Patch Rack

This rack is the home run location for all of the classified fiber coming into the OA from the Comm Room and going out to all of the workstations within the OA. It is all fiber so no routing instructions are provided. This rack and patch panels required to terminate all contractor furnished cabling are CFCI and the location of this rack is defined as rack 2 in Figure 7.

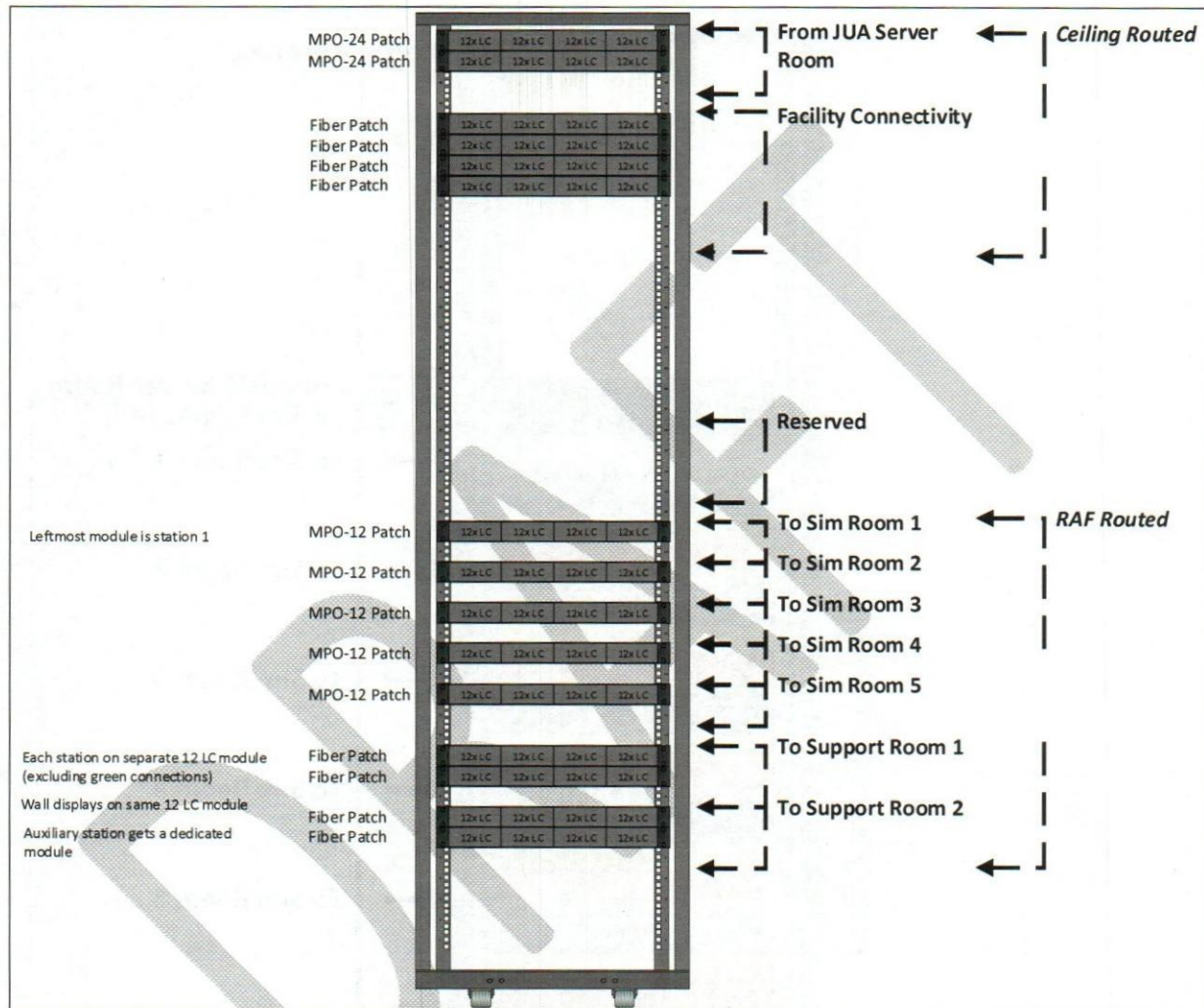


Figure 8 - OA Server Room Classified Fiber Patch Rack

3.2.3.4 OA Server Room Classified Copper Patch Rack

This rack is the home run location for all of the classified fiber going out to all of the workstations within the OA. It is broken up logically by room with a dedicated patch panel per cable color. All cables routed to intra-OA rooms are in the RAF. The cables routed to the Comm Room is through the conduit to that room. This rack and patch panels required to terminate all contractor furnished cabling are CFCI and the location of this rack is defined as rack 1 in Figure 7.

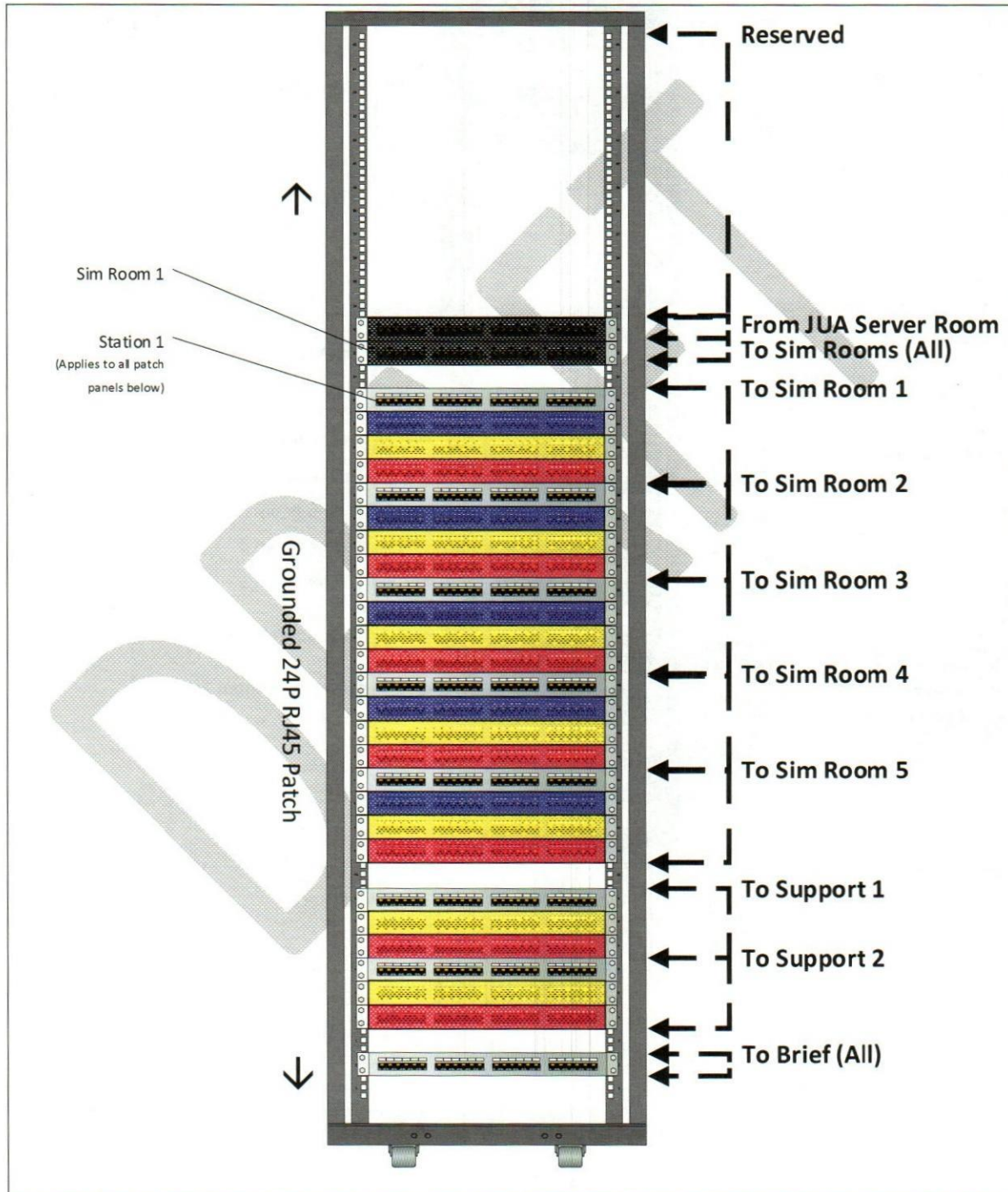


Figure 9 - OA Server Room Classified Copper Patch Rack

3.2.3.5 OA Server Room Unclassified Patch Rack

This server rack is the home run location for all unclassified connectivity into the OA and going out to the stations throughout the OA. It is a blend of copper and fiber so routing instructions are provided in Figure 10. This rack and the patch panels required to terminate all contractor furnished cabling are CFCI and the location of this rack is defined as rack 3 in Figure 7.

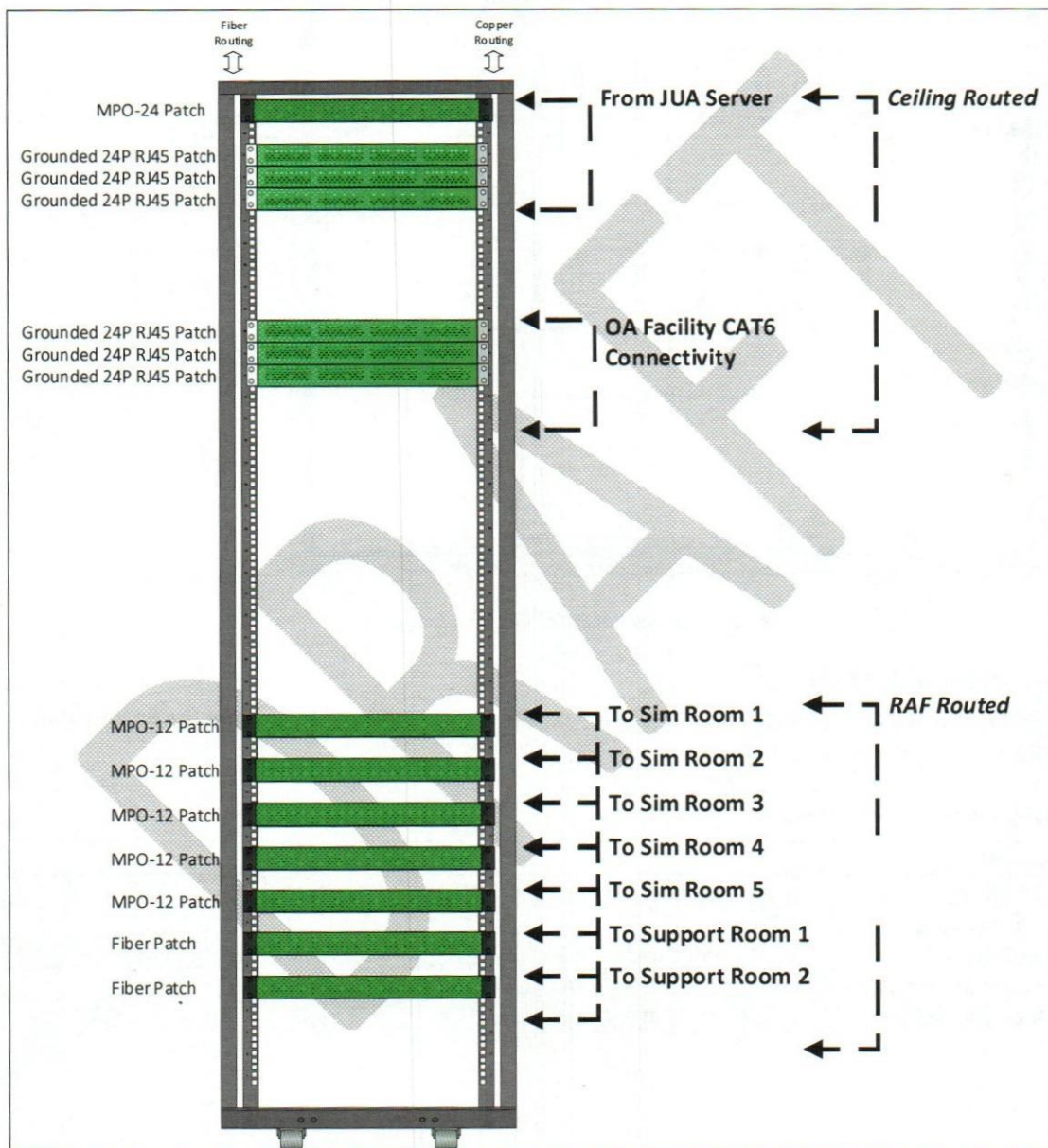


Figure 10 - OA Unclassified Patch Rack

3.2.3.6 Brief/Debrief Room

The assumption driving this station is that there will be a podium or location where a small form factor PC can sit with connectivity to the display. The squadron will derive the room requirements and FF&E. The connectivity provided in Figure 11 is provided for guidance. It is desired that wall connectivity provides flexibility for many potential furniture arrangements. The final location of the various wall boxes should be aligned with the rows of tables provided in this room.

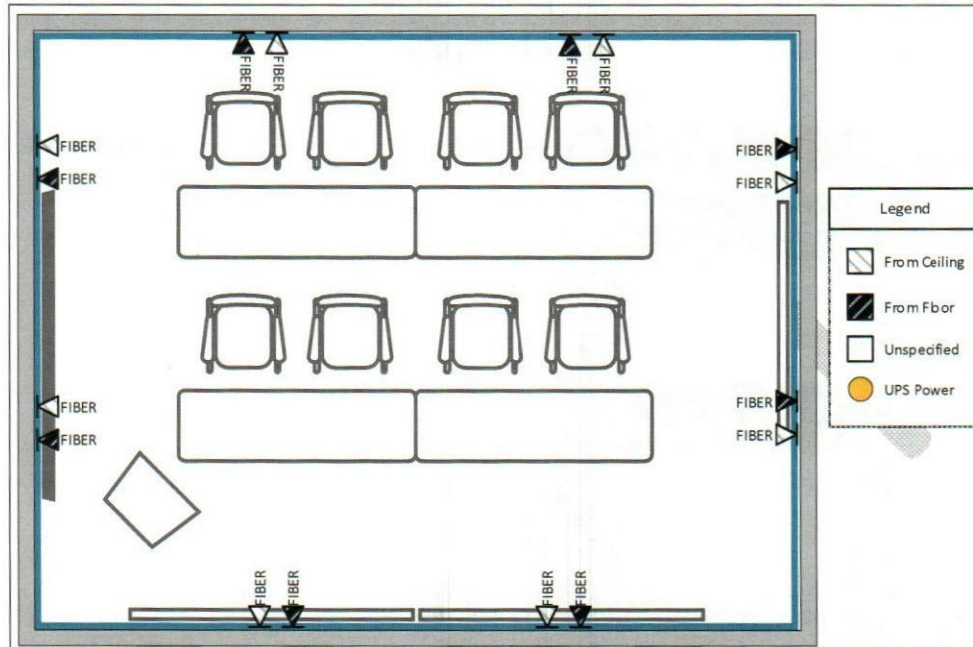


Figure 11 - Brief/Debrief Room Planning Diagram

3.2.3.7 Brief/Debrief Station

This station is a small form factor workstation. A shelf with connectivity is sufficient to host but the final solution should be verified by the government.

Table 14 - Brief/Debrief Station Requirements

Station Specifications	
Dimensions (HxWxD)	N/A
Power Consumption (w)	250w
Power Connectivity	1 x 5-15R Quad
Facility Network Connectivity	4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)
Sim Network Connectivity	4 x CAT6 F/UTP (Gray)

3.3 Joint Use Area (JUA)

The joint use area encompasses the rooms that are indirectly associated with the OAs. Due to their support role for the OAs, the UPS in the Comm Server Room should power the workstations in the Network Ops room and the JUA Support rooms.

Table 15 - Joint Use Area Top Level Specifications

Area Specifications	
Under Floor Access	<ul style="list-style-type: none">• Common RAF with pre-installed ladder rack and cable trays to allow connectivity from server room to all racks and workstation locations within the JUA.• Cable trays for fiber shall have a solid bottom
Cooling	<ul style="list-style-type: none">• The cooling shall be a minimum of n+1 redundant and allow it to be shutoff for maintenance without impacting the OAs.
Power Feeds	<ul style="list-style-type: none">• All rooms shall be on the generator• All UPS power shall be fed from the UPS within the Comm Server Room• The UPS shall be sized to accommodate the JUA and the Comm Server Room
Total Estimated Power on UPS(w)	85,271 (no margins)
Facility Network Connectivity	All stations get the following connections unless otherwise specified: 4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)

3.3.1 JUA Server Room

This server room is common to the area and is shared between the JUA and the OAs. This room shall have a hot aisle containment system built in for each row of racks. For a reduced schedule risk, it is recommended that a system capable of supporting a heterogeneous set of racks be used. This will allow for the hot aisle containment to be installed and tested without any racks being present. This should allow for the facility contractor to be disconnected from the physical accreditation and the delivery of racks from the government.

Table 16 - Comm Server Room Specifications

Room Specifications	
Minimum Room Size	19' x 36.5'
Nominal Occupants	0
Total Estimated Power on UPS(w)	63,194 (no margins)
Environmental	Hot aisle containment allowing for heterogeneous racks, e.g. Vertiv Aisle Containment System pre-installed with blanking panels for all rack locations
Electrical	JUA electrical panels within this room
Backup Power	2n with a minimum of 30 minutes powering backup power panels for the rest of the JUA
Facility Network Connectivity	4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (Standard)
Sim Network Connectivity	Connectivity to OA Server rooms is defined in Table 11. Connectivity to the Secure Comms Room: 4 x MPO-24 Trunks (Standard); 1 x MPO-24 Trunks (Green if possible)
Intended Rack Model	Tripplite SR45UBDP - 45U Deep Rack

Table 17 - Comm Server Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Chilled Water; Hot Aisle Isolation; In-Row Chillers
Fire Detection	Early Detection
Fire Suppression	Clean agent; Wet Pipe Sprinkler; High Temp Heads (200F); Recessed
Lighting	Recessed; Emergency Lighting
Power	Generator; UPS
Special Requirements	Manual Smoke Exhaustion; 2N 30-Min UPS feeding JUA rooms as applicable

3.3.1.1 Comm Server Room Rack Specifications

This table shows the current size, weight, and power estimates for each rack within the Comm Server Room. The number of racks that can be housed within the server room is dependent on room size and layout. The threshold is 14 with an objective of 20.

Table 18 - Comm Server Room Rack Specifications

Rack Id	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
B01	83.75 x 23.63 x 48.5	900	2 x L21-20R	729
B02	83.75 x 23.63 x 48.5	3784	2 x Hubble 460R9W; 2 x L21-20R	1280
B03	83.75 x 23.63 x 48.5	1745	2 x Hubble 460R9W; 2 x L21-20R	950
B04	83.75 x 23.63 x 48.5	1910	2 x L21-20R	773
B05	83.75 x 23.63 x 48.5	2285	2 x L21-20R	782
B06	83.75 x 23.63 x 48.5	3090	2 x L21-20R	907
B07	83.75 x 23.63 x 48.5	3545	2 x L21-20R	977
B08	83.75 x 23.63 x 48.5	4710	2 x L21-20R	1096
B09	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B10	83.75 x 23.63 x 48.5	2725	2 x L21-20R	899
B11	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B12	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B13	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B14	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B15	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B16	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B17	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B18	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B19	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B20	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

3.3.1.2 JUA Server Room Layout

The following layout is provided to show the rack numbering which is necessary for identifying the location for the CFCI patch racks and the rack where the antenna farm will terminate in. The locations of the aisles are for guidance when designing the final layout of this room. It is understood that the selected UPS system, chillers, and hot aisle equipment will impact the final layout.

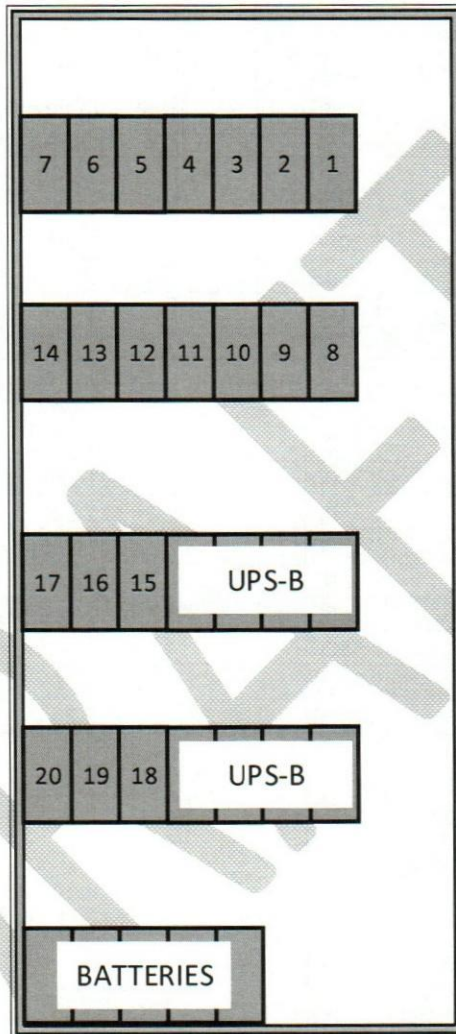


Figure 12 - JUA Server Room Rack Numbering

3.3.1.3 JUA Server Room Classified Patch Rack

This rack will be the home run location for all classified Comm Room connections to the OA Server Rooms and the Secure Comms Room. The connections from these rooms should be MPO trunk cables with LC breakouts on both ends. This rack and patch panels required to terminate all contractor furnished cabling are CFCI and the location of this rack is defined as rack 3 in Figure 12.

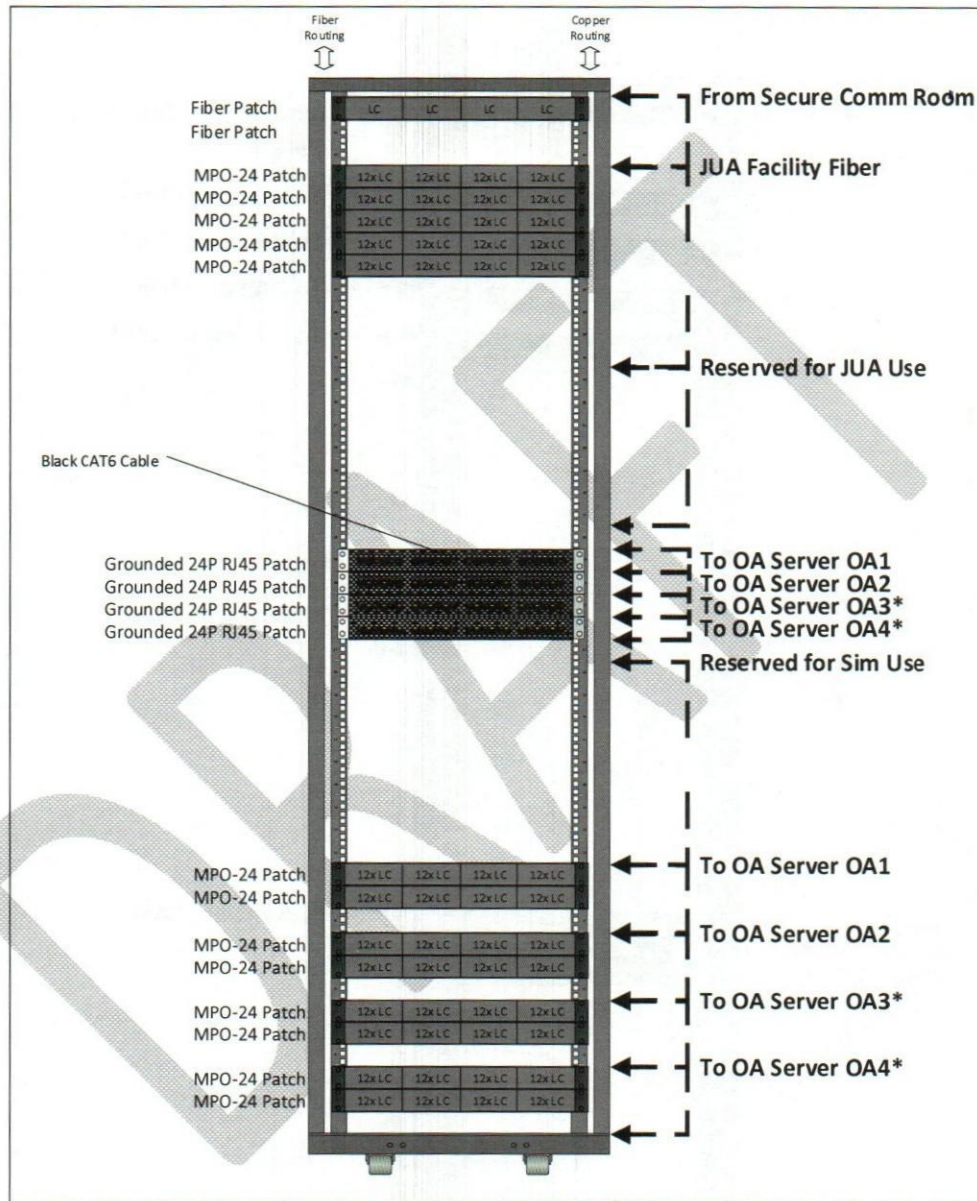


Figure 13 - Comm Server Room Classified Patch Rack Elevation

3.3.1.4 JUA Server Room Unclassified Patch Rack

This rack will be the home run location for all unclassified Comm Room connections to the OA Server Rooms and the Secure Comms Room. The connections from these rooms should be MPO trunk cables with LC breakouts on both ends. This rack and patch panels required to terminate all contractor furnished cabling are CFCI and the location of this rack is defined as rack 2 in Figure 12.

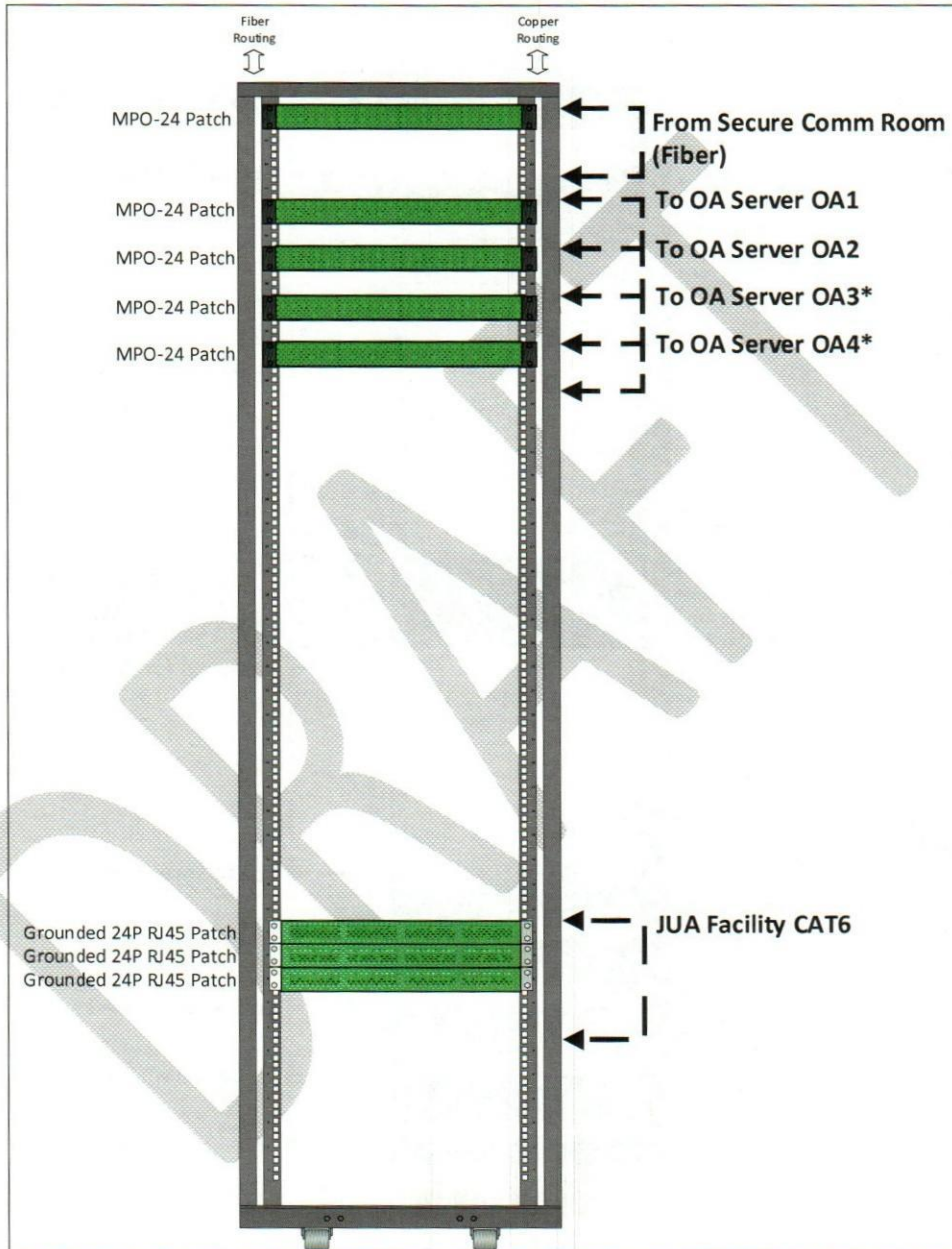


Figure 14 - Comm Server Room Classified Patch Rack Elevation

3.3.1.5 JUA Server Room Antenna Farm

The antenna farm for the building will tie into the Comm Server Room to minimize penetrations into the secure area. The farm should be accessible from within the building or via an alternative method that is approved by government security personnel. The antenna farm shall include a catwalk and/or platform such that all antennas are easily reachable without specialized lifting equipment. All cabling from the antenna farm shall route into rack 1 as defined in Figure 12

Table 19 – Antenna Farm Specifications

Antenna Farm Specifications	
Antenna Type 1	
Quantity	6
Mast Diameter	3 inches
Separation (Center to Center)	12 feet
Antenna Type 2	
Quantity	16
Mast Diameter	3 inches
Separation (Center to Center)	3 feet
Antenna Platform	
Size	10 feet x 10 feet
Data Connectivity	LMR-400 Coax terminated to bulkhead connectors in a lockable weatherproof box
Power	JUA UPS Power with 110VAC (5-20R) in a lockable weatherproof box

4. Acronyms and Abbreviations

Table 20 - Acronyms and Abbreviations

Acronyms / Abbreviations	Description
CAT6	Category 6 UTP Cable
CFCI	Contractor Furnished Contractor Installed
F/UTP	Foil Shielded Untwisted Pair
FF&E	Furniture, Fixtures, and Equipment
GFGI	Government Furnished Government Installed
GSA	General Services Administration
HVAC	Heating, Ventilation, and Air Conditioning
ICD	Interface Control Document
JUA	Joint Use Area
LC	Lucent Connector (Fiber cable terminology)
MPO	Multi-Fiber Push On (Fiber cable terminology)
NSA	National Security Agency
OA	Operations Area
OM	Optical Multimode Fiber
PC	Personal Computer
RAF	Raised Access Floor
UPS	Uninterruptible Power Source
UTP	Untwisted Pair

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX I FACILITY ICD ANNEX B



**US Army Corps
of Engineers ®**
Omaha District

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Grand Forks AFB Building 631 – Ground to Facility ICD – Annex B

Document Number: XXXXXXXX

Revision: DRAFT R.1

Date: February 22, 2023

REVISION HISTORY

The following table identifies each version or issue of this document and provides a description of the purpose or reason for the change. Performing a document comparison between any two versions of this document can identify detailed change differences.

Revision	Document Date	Description of Change	Originator
DRAFT	15-Feb-2023	Initial creation	Daniel Person
DRAFT R.1	22-Feb-2023	Incorporates USACE inputs and synchronizes with ICD Annex A DRAFT R.2	Daniel Person

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1. Purpose

The purpose of this annex is to provide technical specification and general guidance for the data centers, work stations, and rooms associated with the interior Non-Secure Area, Squadron Operations (Squad Ops) areas, and Joint Use Area (JUA) not covered by Annex A. The intended audience is the facility construction contractors.

2. Background

This document pertains to the establishment of Grand Forks Air Force Base (AFB) Building 631 as a facility designed to support aviation system operations, training, and supporting departments. The facility will generally consist of the following areas:

- Two (2) Operational Areas (OAs) – each OA includes simulator rooms, support rooms, a secure comm room, and brief/de-brief rooms. Each OA can be operated completely independently from the other. Both OAs are located on the 1st floor.
- Joint Use Area (JUA) – provides spaces for additional support for both OAs, including an Operations Support/Step Desk room, mission planning, admin support, and a secure comm room to coordinate network connection between the OAs and the rest of the facility. The JUA is located on the 1st floor.
- Squadron Operations (Squad Ops) area – provides spaces to support normal squadron operations, including leadership offices, scheduling, training, mission planning, intel, and comm rooms to facilitate distribution of networks within the spaces. The Squad Ops area includes portions of the 1st and 2nd floors.
- Mass Briefing Room (MBR) – a large space with seating and audio/visual capacity to support briefings of large numbers of personnel at one time. The MBR is located on the 2nd floor.
- Non-Secure Area – includes all interior rooms and space located outside the Intelligence Community Standard (ICS) 705 boundary, such as the building entrance lobby, heritage room, and mechanical and electric rooms. An unclassified comm room will reside in the Non-Secure Area for network distribution within the area. The Non-Secure Area is located on the 1st floor.

For a graphical depiction of the GFAFB Building 631 areas, see [Figure 1](#) for Floor 1 and [Figure 2](#) for Floor 2. Annex A addresses OAs and the portion of the JUA server room room specific to OA support. This document, Annex B, covers all other areas of the facility.

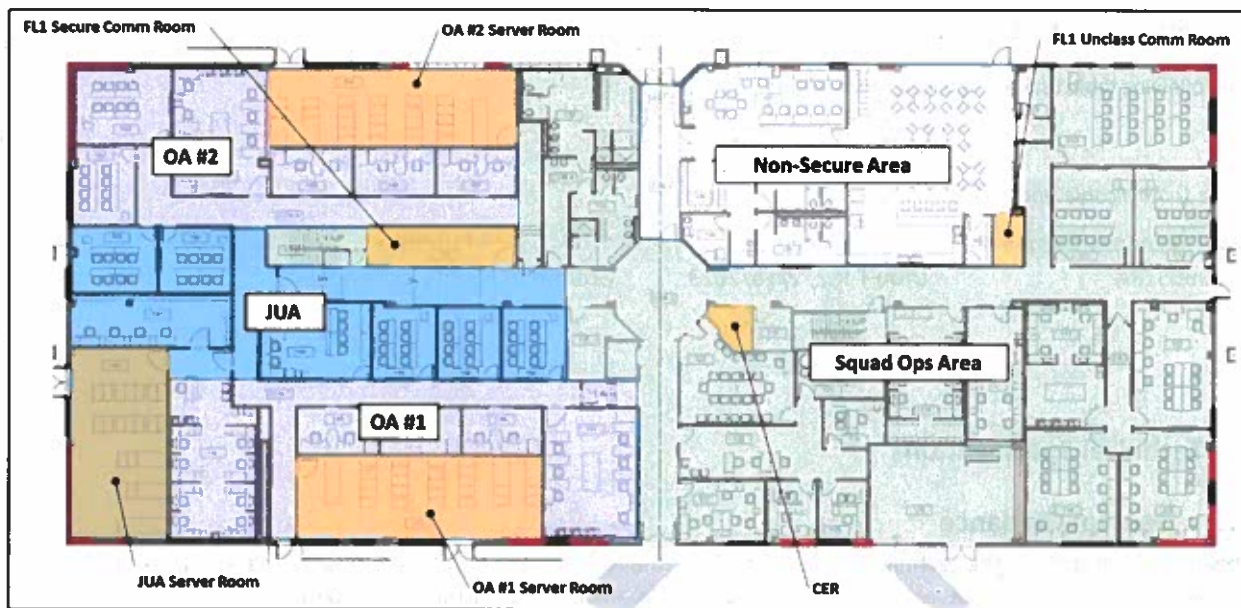


Figure 1 - Building 631 Floor 1 Layout

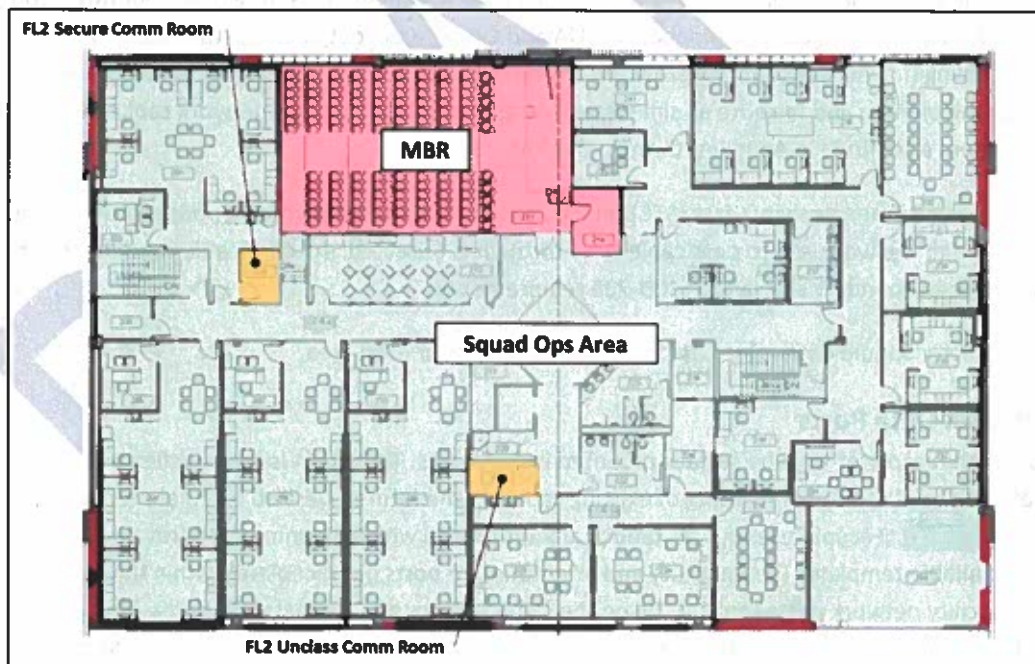


Figure 2 - Building 631 Floor 2 Layout

3. Applicable Documents

The following table lists the applicable documents.

Table 1: Applicable Documents

Document Number	Revision	Title
420B5518A	DRAFT R.2, 2/16/2023	Ground to Facility ICD Annex A

4. Technical Specifications

4.1 General Guidance

This document defines the technical specifications for the Non-Secure Areas, Squad Ops area, MBR, and JUA of the facility. Materials discussed or depicted are notated as Contractor Furnished, Contractor Installed (CFCI) or Government Furnished, Government Installed (GFGI) where applicable.

4.1.1 Cable Routing

The 1st floor of the building including the JUA and OAs shall have a common Raised Access Floor (RAF) and plenum for routing of data cable. The general guidance for JUA and OA network data cable is to route all facility infrastructure cabling (i.e. network cabling providing the facility voice/data comm infrastructure as defined in this annex) through the plenum and to route all sim system infrastructure cabling (i.e. network cabling supporting the installed sim system as defined in Annex A) through the RAF.

In rooms where Sound Transmissivity Class (STC) ratings require that the walls go true floor to true ceiling, penetrations through the wall used to pass cable trays through is expected. All data cable conduits that penetrate the outer secure area boundary shall satisfy ICD-705 requirements.

The facility contractor should determine the power cable routing for each area.

4.1.2 Network Data Ports

Network ports and faceplates shall be surface mounted in wallboxes. The intent is to allow flexibility to the users for routing of additional cables or rerouting of existing cables in the future. Desired faceplate templates are shown in Figure 3 and Figure 4. Faceplate layout deviations are authorized with Government approval to conform with commercially available templates (i.e. quantity and orientation of ports per faceplate) within the following guidelines: (a) facility network ports shall not be on the same faceplate as sim network ports, (b) green facility network ports shall not share a faceplate with any other network ports, and (c) facility network fiber ports for wall mounted displays shall be contained on an independent faceplate for each display. Figure 5 shows a notional wallbox layout with faceplate templates identified as an example. Specific wallbox and faceplate template layouts desired for each facility area are detailed in the appropriate section of this document. All wallboxes and faceplates are CFCI.

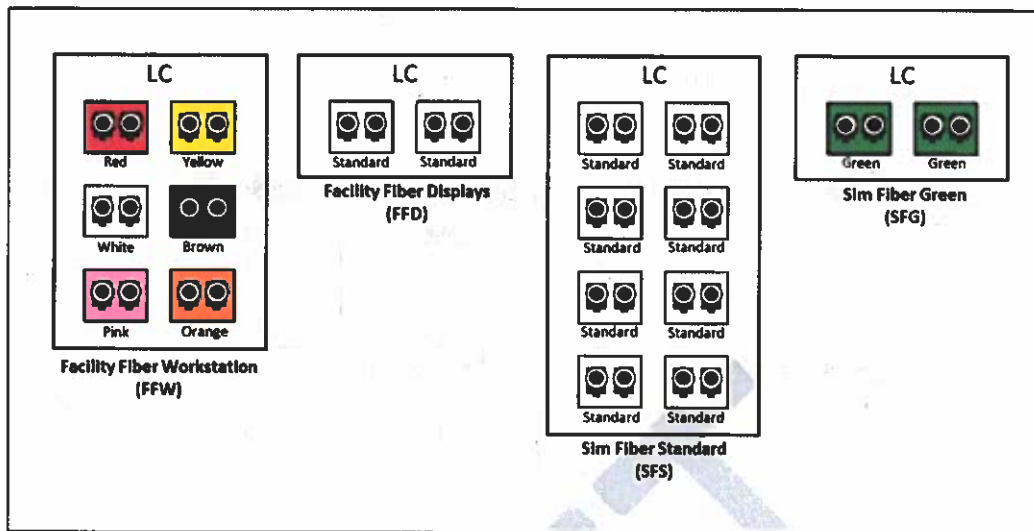


Figure 3 - Fiber Optic Cable Faceplate Templates (CFCI)

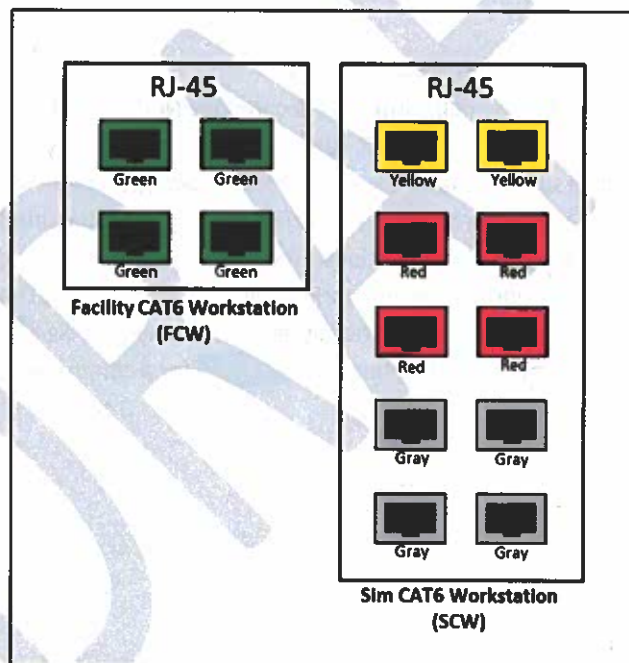


Figure 4 - CAT6 Cable Faceplate Templates (CFCI)

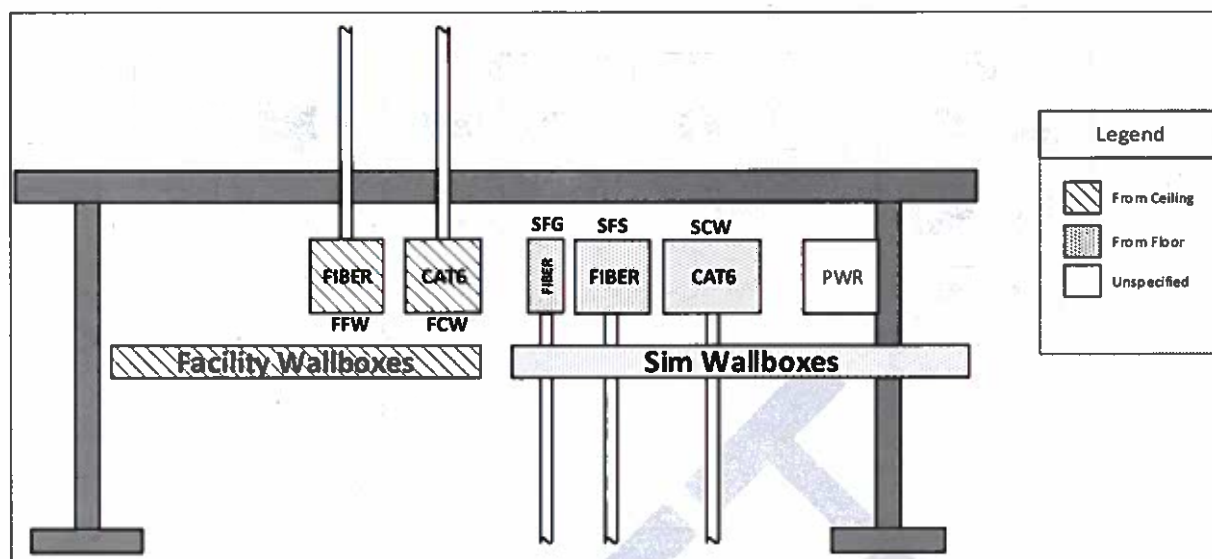


Figure 5 – Notional Workstation Wallbox Installation Example

4.2 Communications (Comm) Room Architecture

All network connectivity will originate from an Information Technology Node (ITN) facility. All network cabling from the ITN, consisting of up to 144 pairs of fiber optic cable, shall enter the facility at the Comm Entrance Room (CER) on the 1st floor. The CER shall support media conversion from fiber optic cable to 25 pairs of CAT6 cable for direct routing to the various comm rooms throughout the facility to support unclassified data and Voice Over Internet Protocol (VOIP) workstation network connections. The CER shall also route fiber optic cables to the various comm rooms to support other workstation network connections throughout the facility. The following sections detail each comm room including specifications and server rack layouts. See Figure 1 and Figure 2 for a graphical depiction of Building 631 comm room locations and Figure 3 for a comm room architecture depiction.

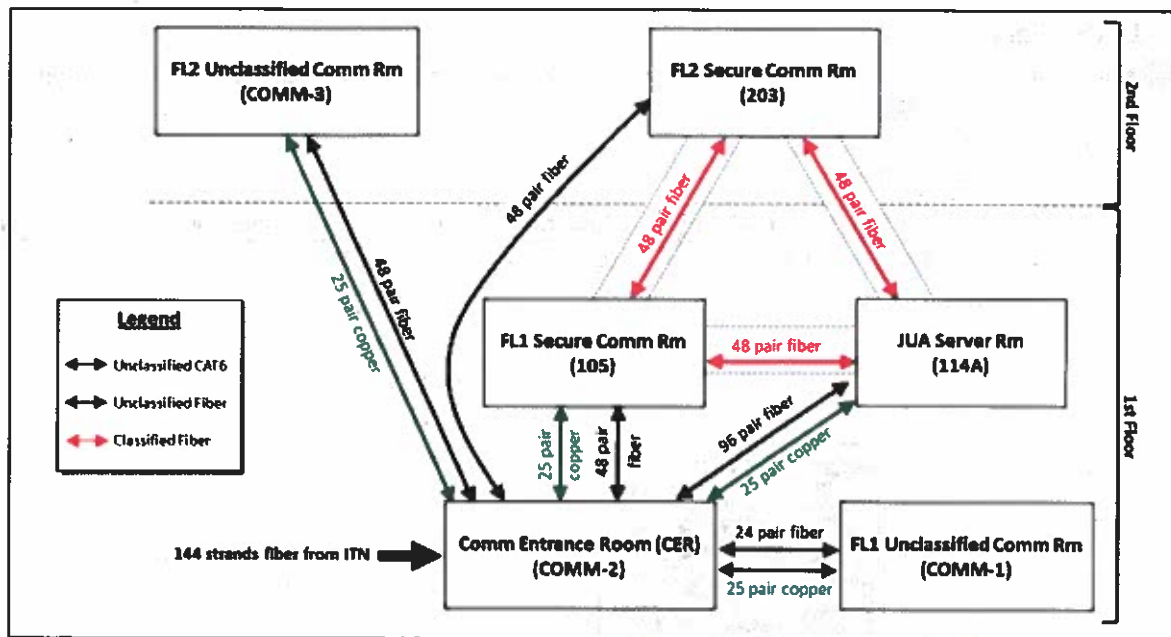


Figure 6 - Facility Comm Room Architecture

4.2.1 Comm Entrance Room (CER)

The CER shall include one 45U server rack. The CER rack will be the termination point for all fiber connections with the ITN as well as the fiber and CAT6 conduits between the other facility comm rooms per Figure 6. See Table 2 and Table 3 for specification details.

Table 2 - CER Specifications

Room Specifications	
Minimum Room Size	60 sq ft
Nominal Occupants	0
Total Estimated Power (W)	3,500
Environmental	Facility cooling
Backup Power	Facility generator; in-rack UPS
Intended Rack Size	45U Rack

Table 3 - CER Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Standard lock
Cooling	Ambient air cooling
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler
Lighting	Recessed or Pendant; Emergency Lighting
Power	Facility power

4.2.1.1 CER Server Rack

Table 4 shows the desired size, weight, and power estimates for the CER rack. The rack and all rack-mounted components depicted in Figure 7 shall be CFCI.

Table 4 - CER Server Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
C01	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

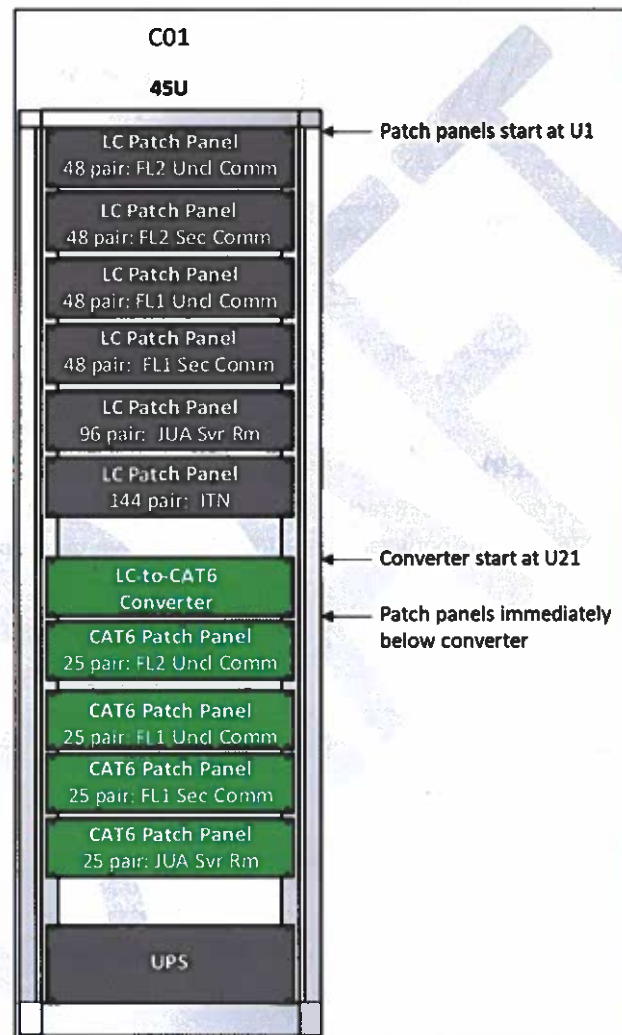


Figure 7 - Comm Entrance Room (CER) Rack Elevation

4.2.2 FL1 Unclassified Comm Room

The 1st Floor (FL1) Unclassified Comm Room shall serve as the homerun location for all Non-Secure Area workstation ports which shall consist solely of CAT6 connections. Fiber conduits shall also be provisioned from the CER to the FL1 Unclassified Comm Room to provide future flexibility and growth. See Table 5 and Table 6 for specification details

Table 5 – FL1 Unclassified Comm Room Specifications

Room Specifications	
Minimum Room Size	60 sq ft
Nominal Occupants	0
Total Estimated Power (W)	1,750
Environmental	Facility cooling
Backup Power	Facility generator; in-rack UPS
Intended Rack Size	45U Rack

Table 6 - FL1 Unclassified Comm Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Standard lock
Cooling	Ambient air cooling
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler
Lighting	Recessed or Pendant; Emergency Lighting
Power	Facility power

4.2.2.1 FL1 Unclassified Comm Room Server Rack

Table 7 shows the desired size, weight, and power estimates the FL1 Unclassified Comm Room rack. The rack, LC-to-CAT6 media converter, patch panels, and Uninterruptible Power Supply (UPS) shall all be CFCI per Figure 8.

Table 7 – FL1 Unclassified Comm Room Server Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
C02	CFCI	83.75 x 23.63 x 48.5	1,750	2 x L21-20R	1000

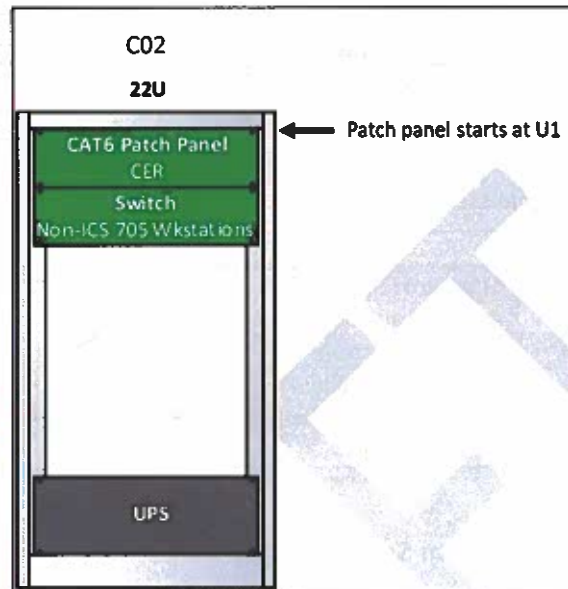


Figure 8 - FL1 Unclassified Comm Room Server Rack Elevation

4.2.3 FL1 Secure Comm Room

The 1st Floor (FL1) Secure Comm Room shall act as the hub for facility classified network distribution including encryption/decryption. It will also be the homerun location for all 1st floor Squad Ops classified and unclassified workstation and wall display ports (i.e. 1st floor rooms not included in the Non-Secure Area, JUA, or OAs). The FL1 Secure Comm Room shall be connected via conduit to the JUA Server Room and 2nd floor (FL2) Secure Comm Room to provide unencrypted classified network connections throughout the facility.

Table 8 – FL1 Secure Comm Room Specifications

Room Specifications	
Minimum Room Size	240 sq ft
Nominal Occupants	0
Total Estimated Power (W)	35,000
Environmental	Ambient air cooling
Backup Power	Facility generator; in-rack UPS
Intended Rack Size	45U Racks

Table 9 – FL1 Secure Comm Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Ambient air cooling
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler
Lighting	Recessed or Pendant; Emergency Lighting
Power	Facility power

4.2.3.1 FL1 Secure Comm Room Server Racks

Table 10 shows the desired size, weight, and power estimates for each rack within the FL1 Secure Comm Room, and Figure 9 shows the desired room layout. Note that only racks A01 through A05 shall be provided as CFCI as well as the highlighted equipment in Figure 10. All other depicted rack components shall be GFGI. The space for racks A06 through A10 in Figure 9 shall be reserved for future population of additional racks.

Table 10 – FL1 Secure Comm Room Server Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
A01	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A02	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A03	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A04	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A05	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A06*	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A07*	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A08*	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A09*	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
A10*	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

* Indicates reserved for future growth; no CFCI rack shall be delivered under this contract

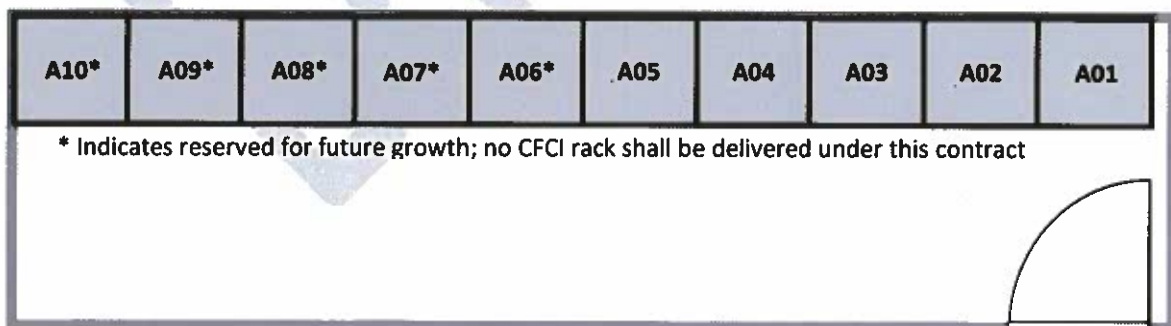


Figure 9 - FL1 Secure Comm Room Layout

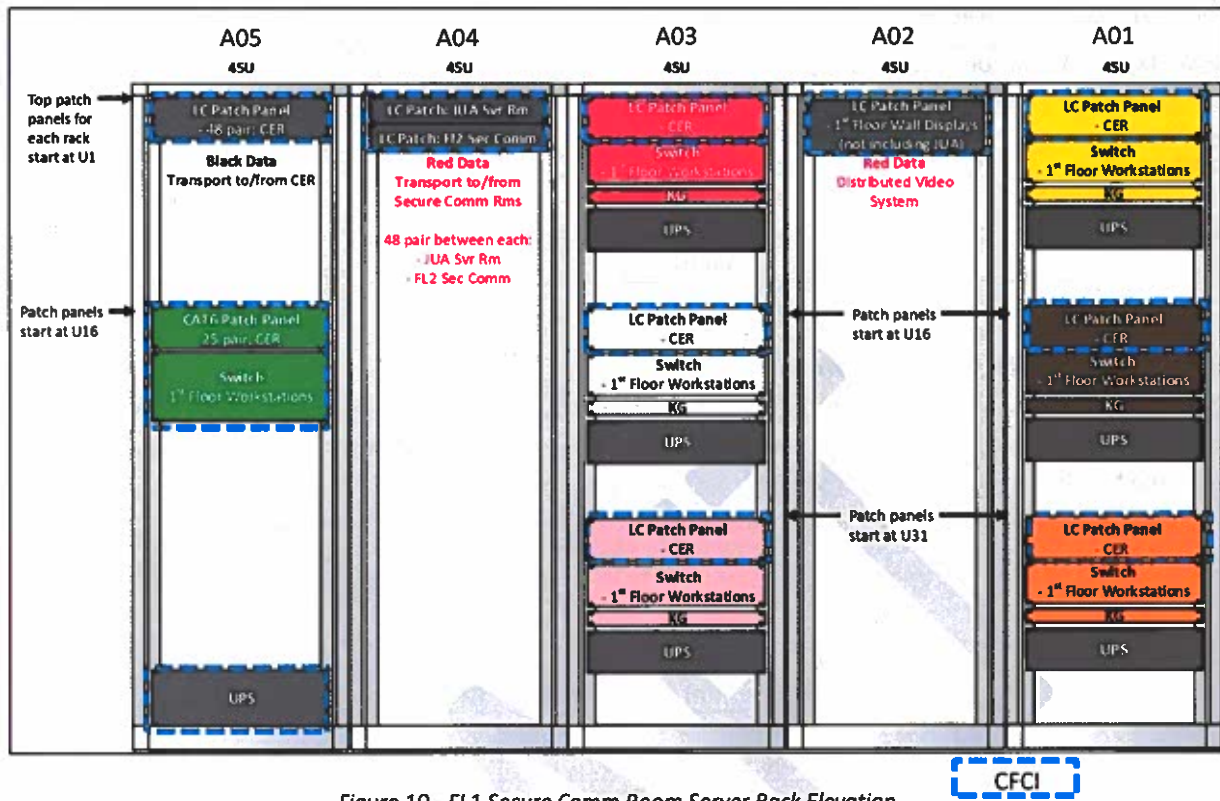


Figure 10 - FL1 Secure Comm Room Server Rack Elevation

4.2.4 JUA Server Room

This server room is common to the area and is shared between the JUA and the OAs. This room shall have a hot aisle containment system built in for each row of racks. The hot aisle containment system shall support a heterogeneous set of racks. This will allow for the hot aisle containment to be installed and tested without any racks being present. This should allow for the facility contractor to be disconnected from the physical accreditation and the delivery of racks from the Sim Contractor.

Table 11 – JUA Server Room Specifications

Room Specifications	
Minimum Room Size	19' x 36.5'
Nominal Occupants	0
Total Estimated Power on UPS(w)	42,194
Environmental	Hot aisle containment allowing for heterogeneous racks, e.g. Vertiv Aisle Containment System pre-installed with blanking panels for all rack locations
Electrical	JUA electrical panels within this room
Backup Power	2n with a minimum of 30 minutes powering backup power panels for the rest of the JUA
Intended Rack Model	TrippLite SR45UBDP – 45U Deep Rack

Table 12 – JUA Server Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Chilled Water; Hot Aisle Isolation; In-Row Chillers
Fire Detection	Early Detection
Fire Suppression	Clean agent; Wet Pipe Sprinkler; High Temp Heads (200F)
Lighting	Recessed; Emergency Lighting
Power	Generator; UPS
Special Requirements	Manual Smoke Exhaustion; 2N 30-Min UPS feeding JUA rooms as applicable

4.2.4.1 JUA Server Room Rack Specifications

Table 13 shows the current size, weight, and power estimates for each rack within the JUA Server Room. The number of racks that can be housed within the server room is dependent on room size and layout. The JUA Server Room shall be sized to support a minimum of 14 racks.

Table 13 – JUA Server Room Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
B01	CFCI	83.75 x 23.63 x 48.5	900	2 x L21-20R	729
B02	CFCI	83.75 x 23.63 x 48.5	3784	2 x Hubble 460R9W; 2 x L21-20R	1280
B03	CFCI	83.75 x 23.63 x 48.5	1745	2 x Hubble 460R9W; 2 x L21-20R	950
B04	GFGI	83.75 x 23.63 x 48.5	1910	2 x L21-20R	773
B05	GFGI	83.75 x 23.63 x 48.5	2285	2 x L21-20R	782
B06	GFGI	83.75 x 23.63 x 48.5	3090	2 x L21-20R	907
B07	GFGI	83.75 x 23.63 x 48.5	3545	2 x L21-20R	977
B08	GFGI	83.75 x 23.63 x 48.5	4710	2 x L21-20R	1096
B09	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B10	GFGI	83.75 x 23.63 x 48.5	2725	2 x L21-20R	899
B11	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B12	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B13	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
B14	GFGI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

4.2.4.2 JUA Server Room Layout

The following Bldg 631 JUA Server Room layout is provided to show the rack numbering which is necessary for identifying the location for the CFCI patch racks and the rack where the antenna farm will terminate. The locations of the aisles are for guidance when designing the final layout of this room. It is understood that the selected UPS system, chillers, and hot aisle equipment will impact the final layout.

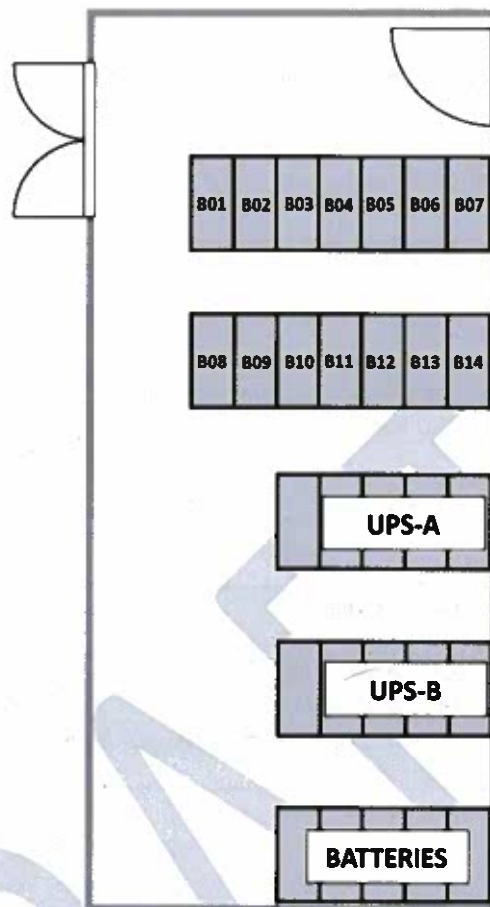


Figure 11 - JUA Server Room Layout

4.2.4.3 JUA Server Room Classified Patch Rack

The JUA Server Room classified patch rack will be B03 in Figure 11 and shall be CFCI. Reference Ground to Facility ICD Annex A per Table 1 for more details on rack components.

4.2.4.4 JUA Comm Room Unclassified Patch Rack

The JUA Server Room unclassified patch rack will be B02 in Figure 11 and shall be CFCI. Reference Ground to Facility ICD Annex A per Table 1 for more details on rack components.

4.2.4.5 JUA Server Room Antenna Farm Termination

The building antenna farm cabling shall route to the JUA Server Room and terminate into rack B01 in Figure 11. The rack and termination panels and cables and shall be CFCI. Reference Ground to Facility ICD Annex A per Table 1 for more details.

4.2.5 FL2 Secure Comm Room

The FL2 Secure Comm Room shall be the homerun location for all 2nd floor classified workstation and wall display ports including the MBR.

Table 14 – FL2 Secure Comm Room Specifications

Room Specifications	
Minimum Room Size	58 sq ft
Nominal Occupants	0
Total Estimated Power (W)	7,000
Environmental	Ambient air cooling
Backup Power	Facility generator; in-rack UPS
Intended Rack Size	45U Rack

Table 15 – FL2 Secure Comm Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Ambient air cooling
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler
Lighting	Recessed or Pendant; Emergency Lighting
Power	Facility power

4.2.5.1 FL2 Secure Comm Room Server Racks

Table 16 shows the desired size, weight, and power estimates for the FL2 Secure Comm Room racks. The racks and all depicted equipment in Figure 13 shall be CFCI.

Table 16 – FL2 Secure Comm Room Server Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
D01	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000
D02	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

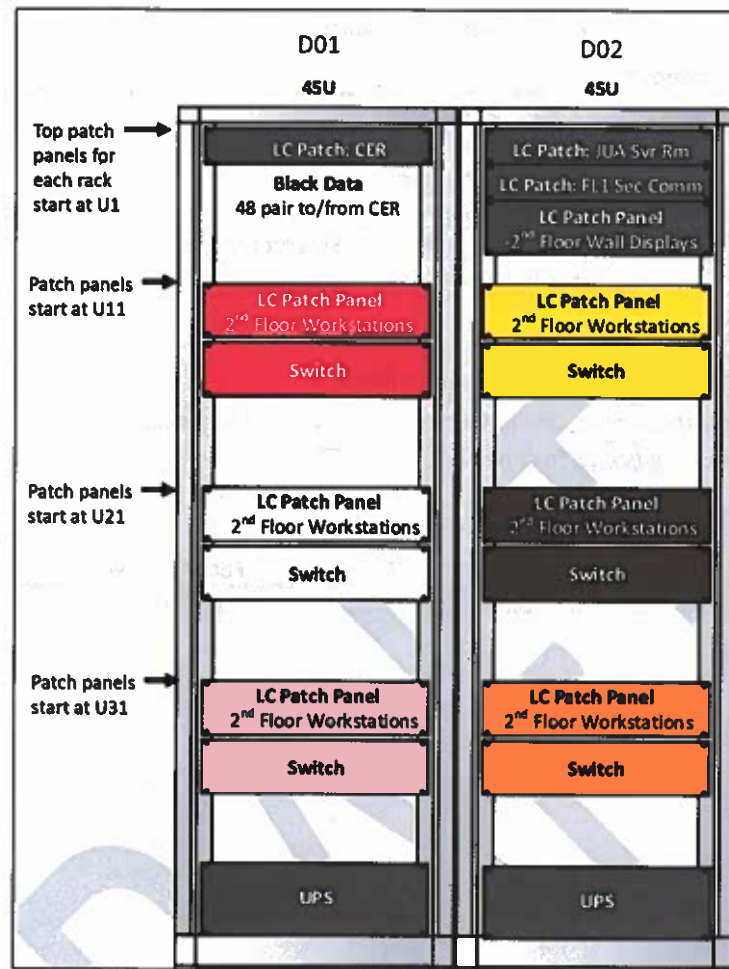


Figure 12 - FL2 Secure Comm Room Server Rack Elevation

4.2.6 FL2 Unclassified Comm Room

The FL2 Unclassified Comm Room shall be the homerun location for all 2nd floor unclassified workstation ports including the MBR.

Table 17 – FL2 Unclassified Comm Room Specifications

Room Specifications	
Minimum Room Size	58 sq ft
Nominal Occupants	0
Total Estimated Power (W)	3,500
Environmental	Ambient air cooling
Backup Power	Facility generator; in-rack UPS
Intended Rack Size	45U Rack

Table 18 – FL2 Unclassified Comm Room Data Sheet Recommendations

Room Data Sheet Recommendations	
Access Control System	Card Reader
Cooling	Ambient air cooling
Fire Detection	Smoke Detection
Fire Suppression	Wet Pipe Sprinkler
Lighting	Recessed or Pendant; Emergency Lighting
Power	Facility power

4.2.6.1 FL2 Unclassified Comm Room Server Rack

Table 19 shows the desired size, weight, and power estimates for the FL2 Unclassified Comm Room rack. The rack and all depicted equipment in Figure 13 shall be CFCI.

Table 19 – FL2 Unclassified Comm Room Server Rack Specifications

Rack Id	CFCI/GFGI	Dimensions (HxWxD)(in)	Power (w)	Facility Power Connectivity	Weight (lbs)
D03	CFCI	83.75 x 23.63 x 48.5	3500	2 x L21-20R	1000

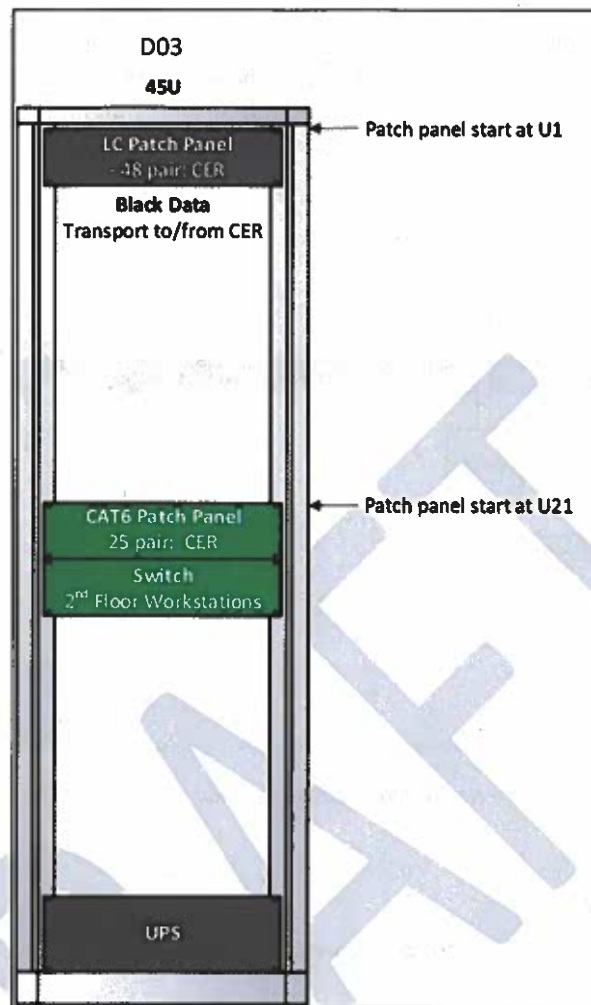


Figure 13 - FL2 Unclassified Comm Room Server Rack Elevation

4.3 Non-Secure Area

The Non-Secure Area includes all rooms and spaces within the interior of the building and outside the ICS-705 boundary.

Table 20 - Non-Secure Area Specifications

Area Specifications	
Cooling	Facility cooling
Power Feeds	All rooms utilize facility power
Total Estimated Power (W)	85,000
Facility Network Connectivity	All stations get the following connections unless otherwise specified: 4 x CAT6 F/UTP (Green)

4.3.1 Non-Secure Area Workstations

Figure 14 shows a general wallbox layout for a workstation in the Non-Secure Area. See Figure 4 for faceplate layouts. Reference facility design package drawings for locations of workstations within each room of the Non-Secure Area.

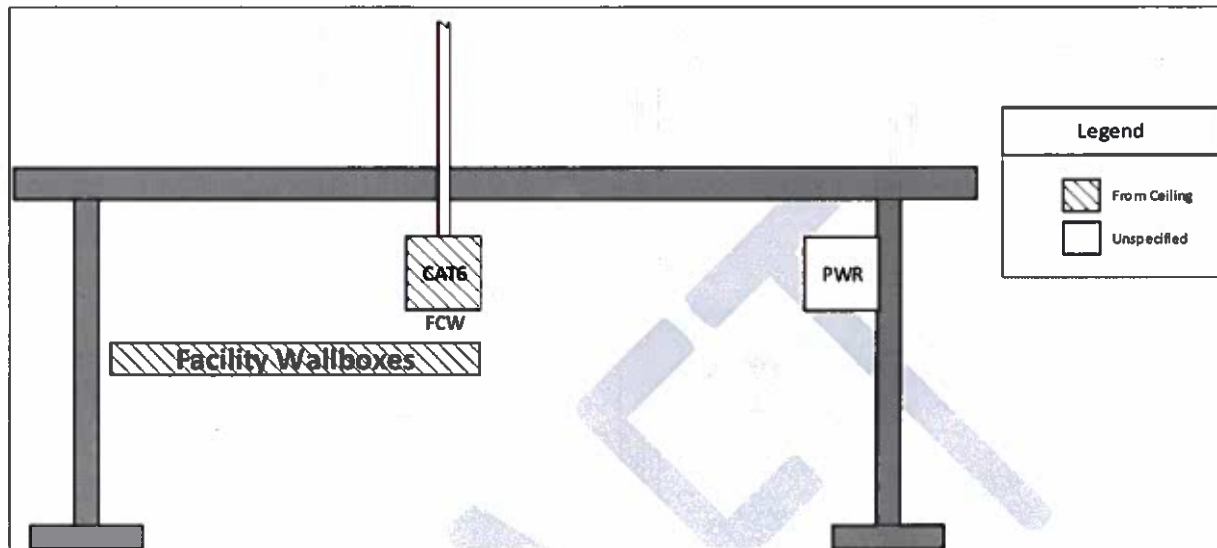


Figure 14 – Non-Secure Area Workstation Wallbox Example

4.4 Joint Use Area (JUA)

The joint use area encompasses the rooms that are indirectly associated with the OAs.

Table 21 - JUA Specifications

Area Specifications	
Under Floor Access	<ul style="list-style-type: none"> Common RAF with pre-installed ladder rack and cable trays to allow connectivity from server room to all racks and workstation locations within the JUA. Cable trays for fiber shall have a solid bottom
Cooling	<ul style="list-style-type: none"> The cooling shall be a minimum of n+1 redundant and allow it to be shutoff for maintenance without impacting the OAs.
Power Feeds	<ul style="list-style-type: none"> All rooms shall be on the generator All UPS power shall be fed from the UPS within the JUA Server Room The UPS shall be sized to accommodate the JUA and the JUA Server Room
Total Estimated Power on UPS(w)	85,271 (no margins)
Facility Network Connectivity	All stations get the following connections unless otherwise specified: 4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)

4.4.1 JUA Workstations

The Operations Support/Step Desk room workstations shall have a wallbox layout shown in [Figure 15](#). All other workstations within the JUA shall have a wallbox layout identical to the Squad Ops area as shown in [Figure 16](#). See [Figure 3](#) and [Figure 4](#) for faceplate layouts. Reference facility design package drawings for locations of workstations within each room of the JUA.

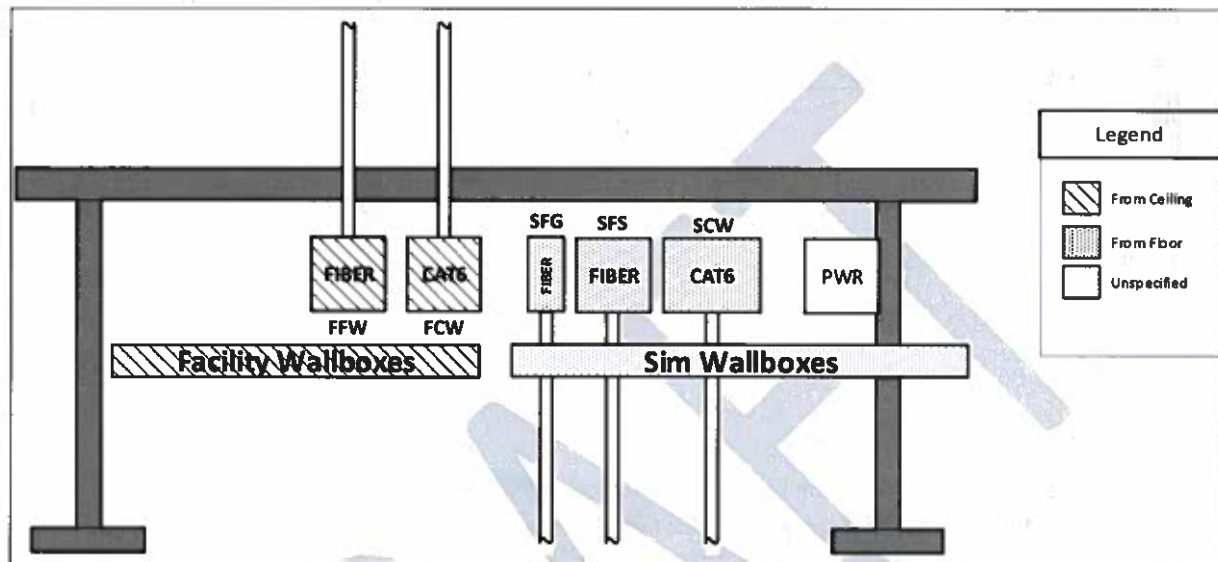


Figure 15 – Operations Support / Step Desk Room Wallbox Layout

4.5 Squadron Operations (Squad Ops) Area

The Squad Ops area consists of all 1st floor spaces not included in the Non-Secure Area, JUA, or OAs as well as all 2nd floor spaces including the MBR.

Table 22 - Squad Ops Area Specifications

Area Specifications	
Cooling	Facility cooling
Power Feeds	All rooms utilize facility power
Total Estimated Power (W)	85,000
Facility Network Connectivity	All stations get the following connections unless otherwise specified: 4 x CAT6 F/UTP (Green); 6 x OM-3+ Fiber (standard)

4.5.1 Squad Ops Workstations

[Figure 16](#) shows a general wallbox layout for workstations in the Squad Ops Area. See [Figure 3](#) and [Figure 4](#) for faceplate layouts. Reference facility design package drawings for locations of workstations within each room of Squad Ops Areas.

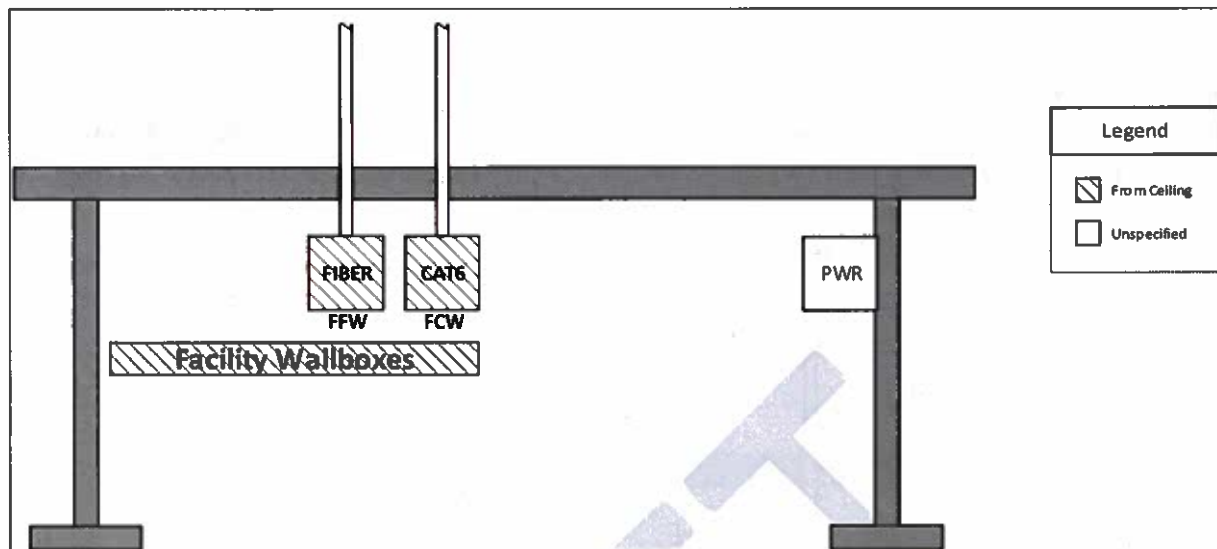


Figure 16 – Squad Ops Workstation Wallbox Example

4.5.2 Mass Briefing Room (MBR)

The MBR will provide a presentation venue for a large audience. Figure 17 shows a general wallbox layout for workstations in the MBR. See Figure 3 and Figure 4 for faceplate layouts. Reference facility design package drawings for locations of workstations within the MBR. Note that the dual Facility Fiber Workstation (FFW) port setup will support secure Video Teleconference (VTC) connection as needed.

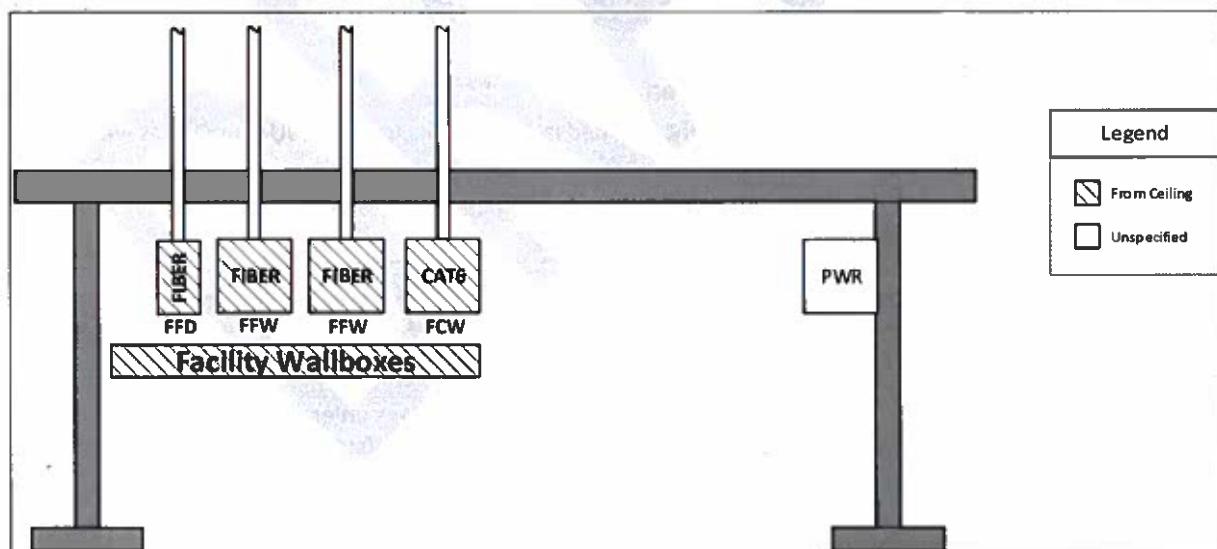


Figure 17 - MBR & VTC Conference Room Workstation Wallbox Layout

4.6 Wall Mounted Displays (Squad Ops Areas and JUA)

Many rooms within the Squad Ops Areas and the JUA will have CFCI wall mounted television displays. Reference facility design package drawings for locations of wall mounted displays within each room. For each display, there shall be a port with two LC fiber connections per the FFD faceplate template in [Figure 3](#) as well as a recessed standard power outlet to plug in the display. Both the FFD faceplate and the power outlet shall be located on the wall so as to be concealed behind the display when it is hung.

4.7 Conference Rooms with Secure Video Teleconference (VTC) Capability

Workstation locations in conference rooms within the ICS-705 boundary shall consist of the wallbox and network port layout as depicted in [Figure 17](#). The dual FFW port setup will support secure Video Teleconference (VTC) connection as needed. Reference facility design package drawings for locations of workstations within each conference room.

5. Acronyms and Abbreviations

Table 23 - Acronyms and Abbreviations

Acronyms / Abbreviations	Description
CAT6	Category 6 UTP Cable
CFCI	Contractor Furnished, Contractor Installed
F/UTP	Foil Shielded Untwisted Pair
FF&E	Furniture, Fixtures, and Equipment
GFGI	Government Furnished, Government Installed
ICD	Interface Control Document
ITN	Information Technology Node
JUA	Joint Use Area
LC	Lucent Connector (Fiber cable terminology)
MPO	Multi-Fiber Push On (Fiber cable terminology)
OA	Operations Area
OM	Optical Multimode Fiber
PC	Personal Computer
RAF	Raised Access Floor
UPS	Uninterruptible Power Supply
UTP	Untwisted Pair
VOIP	Voice Over Internet Protocol

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SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX J CYBERSECURITY



**US Army Corps
of Engineers ®**
Omaha District

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Index	"Control" or "Monitor only"	FRCS Type and Description		Mission Description	Preliminary Baseline C-I-A								
		FRCS Type	System Name		Mission Support			Mission Essential			Mission Critical		
				Business and Mission Supported:	C	I	A	C	I	A	C	I	A
1	Control	Airfield Systems	Aircraft Arresting System (AAS) Control System	Aircraft Arresting Systems (AAS) are both fixed and mobile systems (cable and net) that stop an aircraft and prevent it from overrunning the runway.	NA	NA	NA	L	M	M	M	H	H
2	Control	Airfield Systems	Airfield Lighting Control System	Airfield Lighting Systems include the navigation lighting, approach lighting, runway and taxiway lighting, and parking area lighting systems to ensure safe operations.	NA	NA	NA	L	M	M	M	H	H
3	Control	Airfield Systems	Ramp Lighting Control System [High Mast]	Ramp Lighting Systems are used to illuminate the airfield or pier for nighttime/limited visibility operations and physical security.	NA	NA	NA	L	L	M	M	M	H
4	Monitor only	Airfield Systems	Runway Ice Detection System (RIDS) Control System	Runway Ice Detection System (RIDS) are used to identify icing and reduced surface traction conditions of airfield pavements.	NA	NA	NA	L	L	M	M	M	H

[illegible]

17	Control	Dams, Locks & Levee Systems	Flood Risk Management Control System	Flood Risk Management Systems includes all activities devoted to the effective use [and maintenance] of impoundments, levees, and hurricane protection systems specifically designed for managing water to protect life and economic stability.	L	M	M	L	M	M	NA	NA	NA
18	Control	Dams, Locks & Levee Systems	Hydropower Control System	Hydropower Control Systems are traditionally supervisory control and data acquisition (SCADA) systems to produce and distribute electric power.	L	L	L	L	L	L	NA	NA	NA
19	Control	Dams, Locks & Levee Systems	Navigation Control System	Navigation Control Systems operate locking facilities.	L	L	L	L	L	L	NA	NA	NA
20	Control	Electronic Security System (ESS)	Access Control System (ACS)	Access Control Systems (ACS) are automated systems that interface with locking mechanisms that momentarily permit access (for example, by unlocking doors or gates) after verifying entry credentials (e.g., using a card reader). DoDM 5200.01 vol 3; OPNAVINST 5530.14E refer to the ACS as an Automated Access Control System, Electronic Entry Control system, or Keyless Access System. ACS is a subsystem of an ESS.	M	M	M	M	H	H	H	H	H

21	Monitor only	Electronic Security System (ESS)	CBRNE Monitoring and Notification Systems	CBRNE Notification Systems consist of the monitoring system, sensors and devices to detect chemical, biological, radiological, nuclear and explosive compounds and alarm and/or interact with other facility systems to prevent contaminants from spreading into other parts of the facility and provide safe haven areas for people within the facility.	L	M	M	L	M	M	L	H	H
22	Control	Electronic Security System (ESS)	Electronic Security System (ESS)	Electronic Security Systems (ESS) are a collection of multiple ESS, such as interior and exterior Intrusion Detection System (IDS), Closed Circuit Television (CCTV) system for assessment of alarm conditions, Access Control Systems (ACS), Data Transmission Media (DTM), and alarm reporting systems for monitoring, control, and display.	M	M	M	M	M	M	M	H	H
23	Monitor only	Electronic Security System (ESS)	Intrusion Detection Systems (IDS)	Intrusion Detection Systems (IDS) are used to identify people who have entered into a secure area. IDS consists of many different sensors such as infrared, microwave, glass break, vibration, and magnetic. (When integrated with a control system which performs another function - such as access control to secure the doors - this becomes part of an ESS.)	L	L	L	L	M	L	M	H	M
24	Control	Electronic Security System (ESS)	Physical Access Control Systems (PACS)	Facility-Related Physical Access Control Systems (PACS), such as Installation Entry Control systems (IEC) are part of the installation ATFP perimeter defense. The IEC may consist of vehicle pop-up barriers, mantraps, entry gates, rejection/holding areas, lighting and messaging/way finding signage.	M	M	M	M	H	H	H	H	H

25	Control	Electronic Security System (ESS)	Residential (Billet) Keyless Entry Control System (RKECS)	Residential (Billet) Keyless Entry Control Systems (RKECS) are used in dormitories, BAQ, TLQ and other facilities for access control.	L	L	L	L	L	L	NA	NA	NA
26	Monitor only	Environmental Monitoring (EM)	Environmental Monitoring Systems	Monitoring systems that record ambient environmental parameters (e.g. temperature, flow, direction, concentration, etc.) for environmental media (e.g. air, water, soil, vapors/emissions, etc.) on a user defined basis. These systems are generally passive and require only one-way data communication with a receiver.	L	M	L	L	M	L	L	M	M
27	Monitor only	Environmental Monitoring (EM)	Environmental Sampling Systems	Monitoring systems that record ambient environmental parameters (e.g. temperature, flow, direction, concentration, etc.) and collect environmental media samples (e.g. air, water, soil, vapors/emissions, etc.) on a user defined basis or under pre-programmed settings. These systems are generally passive but collect and store samples as required under regulatory permit programs (e.g. Clean Air Act Title V, Clean Water Act NPDES, Safe Drinking Water Act, RCRA Landfills, etc.). These systems require one-way data communication with a receiver and notification to user to retrieve sample.	L	M	L	L	M	L	L	M	M
28	Control	Environmental Remediation (ER)	Environmental Remediation Systems	OT systems that control physical environmental remediation equipment (e.g. Groundwater Pump-and-Treat system, Granular Activated Carbon, Soil-Vapor Extraction system, Bio-Venting/Bio-Sparging system, etc.). This OT records ambient environmental parameters (e.g. temperature, flow, direction, concentration, etc.) for environmental media (e.g. air, water, soil, vapors/emissions, etc.) and actively controls transport (pumping, discharge, release, etc.) of the environmental media on a user defined basis or under pre-programmed settings.	L	M	L	L	M	M	L	M	M

29	Control	Fire & Life Safety (FLS)	Fire Pump Control System	Fire pumps pump water to fire sprinkler systems, fire hydrants, and standpipes. Fire pump controllers are control panels containing electrical components such as circuit breaker, switches, relays and other devices dedicated to the operation of fire pumps. The devices within a fire pump controller panel perform such functions as receiving signals from alarm devices, such as pressure operated switches, sprinkler alarm valves or remote fire alarm equipment; activating motor control devices to provide electric power to motors driving fire pumps and monitoring the fire pump operation and performance.	L	M	M	L	M	M	L	H	H
30	Control	Fire & Life Safety (FLS)	Fire Suppression System (FSS) Control System	Fire suppression/extinguishing systems including, but not limited to: automatic sprinkler systems; water spray systems; foam systems; standpipe systems; dry chemical extinguishing systems; wet chemical extinguishing systems; clean agent fire extinguishing systems; water mist fire protection systems; carbon dioxide systems; and, halon 1301 systems.	L	M	M	L	M	M	L	H	H
31	Monitor only	Fire & Life Safety (FLS)	Fire Alarm Reporting Control System	Fire Alarm Reporting Systems are installation-wide reporting systems that connect the Facility fire alarm control panel(s) to a constantly attended location staffed with qualified operators for the receipt and processing of emergency communications. Air-gapped from LAN, WAN, not Internet connected (Per UFC 3-600-01).	L	L	L	L	L	L	L	M	M
32	Control	Fire & Life Safety (FLS)	Fire Detection and Alarm Control System	Fire Detection and Alarm System is a system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals. Fire alarm systems are analog or addressable wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, alarms, supervisory signal-initiating devices, alarm notification appliances, supervising station fire alarm system transmitter, and other accessories and miscellaneous items. Air-gapped from LAN, WAN, not Internet connected (Per UFC 3-600-01).	L	M	M	L	M	M	L	M	M

33	Control	Fire & Life Safety (FLS)	Gas and Vacuum System for Healthcare Facilities	Medical gas systems include compressed air (medical, dental, instrument, medical laboratory, dental laboratory, process), vacuum (medical, dental surgical, oral evacuation [OE], waste anesthesia gas disposal [WAGD]), exhaust (laboratory dental), positive pressure gases (nitrogen [N], oxygen [O], nitrous oxide [NO], carbon dioxide [CO2]), and the associated equipment, e.g., piping, filters, regulators, alarms, manifolds, and tanks.	L	M	M	L	M	M	L	H	H
34	Monitor only	Fueling Systems	Fuel Leak Detection System Control System	Fuel Leak Detection System (FLDS) are installed on POL and other fluid transport systems to identify leaks and/or loss of pressure that could result in environmental spillage and contamination.	L	M	M	L	M	M	L	M	M
35	Control	Fueling Systems	Petroleum, Oil & Lubricants (POL) Control System [Distribution & Storage]	Petroleum, Oil & Lubricants (POL), Distribution & Storage are a combination of multiple control systems. These systems use Programmable Logic Controllers (PLCs) and Remote Terminal Units (RTUs) spread out over a large geographic area, multiple large volume tanks, an extensive underground pipeline distribution system/pantograph, and interconnects to other IT and OT systems such as an inventory and spill system. This covers systems such as generator fueling distribution control systems.	L	L	L	L	L	L	L	L	L
36	Control	Fueling Systems	Vehicle Fueling Control System	Vehicle Fueling Systems are used to fuel vehicles. Charging systems for Evs are considered Vehicle Fueling Systems. Some vehicle fueling/charging stations/pumps are equipped with credit card terminals. (contain PCI)	L	L	L	L	M	M	L	M	H

45	Control	Utility Control System (UCS)	Electrical Transmission and Distribution Control System	The Electrical Transmission and Distribution Systems are the substations, step-down transformers, switch gear and power cabling that provide power. Includes emergency and back up generators.	L	L	L	L	M	M	L	M	M
46	Control	Utility Control System (UCS)	Gray Water Control System	Gray Water Systems provide water that has been reprocessed from sanitary waste, is not potable, but can be used for irrigation, etc.	L	L	L	L	L	L	L	L	L
47	Control	Utility Control System (UCS)	Industrial Wastewater Treatment System (IWTs) Control System	Industrial Wastewater Treatment Systems (IWTs) reclaim water that has been used for industrial processes such as manufacturing, operations and maintenance, chill water effluent, and deicing operations and contain chemicals or solids that must be removed prior to discharge into other bodies of water.	L	L	L	L	L	L	L	M	M
48	Control	Utility Control System (UCS)	Microgrid Control System (MCS)	A Microgrid Control System is a specific type of electronic system, but it essentially consists of a "District Electrical Generation Control System" and an "Electronic Transmission and Distribution Control System". A microgrid is generally designed to connect and disconnect from the grid to enable it to operate in both grid- connected or island mode.	L	L	L	L	M	M	L	M	M

49	Control	Utility Control System (UCS)	Natural Gas Control System	Natural Gas Systems are the distribution pipelines, pumps and controls used to provide the natural gas commodity from the supplier to the end user.	L	L	L	L	L	L	L	M	M
50	Control	Utility Control System (UCS)	Oil/Water Separators (OWS) Control System	Oil/Water Separators (OWS) separate water and oil from surface water runoff, fuel tanks, marine equipment, and other equipment that has in-line filters to prevent fuel contamination or accidental discharge into other bodies of water. For Navy, OW/WO is typically generated by ships tied up at dock, and uses shore-based collection and pumping systems similar to sewer lift stations, and eventually winds up at the Industrial Waster Treatment Plant (IWTP) for processing.	L	L	L	L	L	L	L	M	M
51	Control	Utility Control System (UCS)	Potable Water Control System	Potable Water Systems are typically municipal utilities that provide the water production, distribution pipelines and end point connection to a building and provide water safe for human consumption. Smaller scale PoWS may operate in remote and less populated areas but utilize the same basic equipment and processes.	L	L	L	L	L	L	L	M	M
52	Control	Utility Control System (UCS)	Pure Water Control System	Pure Water Systems provide deionized and chemical free water used for reactors, ships, medical and manufacturing processes.	L	L	L	L	M	M	M	H	H



SUSTAINMENT

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Distribution of the Facility-Related Control Systems Master List

REFERENCES: a) Chief Information Officer Memorandum, "Control Systems Cybersecurity," December 18, 2018
b) Unified Facilities Criteria (UFC) 4-010-06, "Cybersecurity of Facility-Related Control Systems (FRCS)," January 18, 2017

As required by the DoD Chief Information Officer Memorandum, "Control Systems Cybersecurity," the Department must identify and inventory control systems and supporting networks and develop capabilities to identify cybersecurity risk to other control systems, networks, and assets. Control systems underpin the operation of all Department of Defense (DoD) missions and are key elements in many diverse DoD operating environments. Control systems – which are networked controllers and user interfaces that monitor and control equipment – are prevalent and essential to the function of weapon systems, facilities, medical systems, and the defense industrial base.

In order to effectively identify and categorize assets, this memorandum provides clarification on the categorization of Facility-Related Control Systems (FRCS). Unified Facilities Criteria (UFC) 4-010-06 defines FRCS as a subset of control systems that are used to monitor and control equipment and infrastructure that are part of a DoD building, structure, or linear structure.

This memorandum and attachment provide a baseline to codify the categories that make up FRCS for the DoD. The FRCS Master List at Attachment A provides the type, description, function, and mission description of each FRCS category. The distribution of this list allows DoD Components to address cybersecurity and management of FRCS utilizing a standardized definition. Additionally, the standardization of these categories will enable the DoD Components to more accurately program and budget for FRCS activities. The office recognizes that one list cannot be comprehensive for all DoD Components by virtue of the wide range of missions occurring within the DoD. In the absence of a DoD Component-specific FRCS Master List, DoD Components are able and encouraged to use this list as a guidepost in developing their own DoD Component specific FRCS Master List.

In the absence of a DoD Component-specific FRCS Master List, the DoD Components shall adhere to this standardization effective immediately for Risk Management Framework (RMF) and other cybersecurity efforts. My point of contact for this effort is Walter Ludwig, walter.s.ludwig.civ@mail.mil, or (703) 474 - 7172.

Richard Kidd
Deputy Assistant Secretary of Defense
(Environment and Energy Resilience)

Attachments:
As stated

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PROGRAMS

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

DISASTER RESILIENCY PROGRAM BUILDING 631

GRAND FORKS AFB, ND

APPENDIX K GEOTECHNICAL REPORT



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Preliminary Geotechnical Engineering Report

Disaster Resiliency Program Bldg. 631
Grand Forks Air Force Base, North Dakota

U.S. Army Corps of Engineers, Omaha District
Geotechnical Engineering & Sciences Branch
February 2023

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Preliminary Geotechnical Engineering Report

Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

February 2023



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1.0 Introduction

This report presents the results of a subsurface investigation and preliminary geotechnical engineering analysis for the proposed Disaster Resiliency Program Bldg. 631 at Grand Forks Air Force Base (AFB) west of Grand Forks, North Dakota. The purpose of this report is to provide subsurface information and preliminary recommendations for the proposed project. The contents within this report are provided for information only. It is recommended that a complete geotechnical investigation and final recommendations shall be provided by the Contractor's geotechnical engineer-of-record.

2.0 Site and Project Description

The project includes the renovation of Bldg. 631 and the addition of a new communication building north of Bldg. 631. The preliminary recommendations in this report primarily address the new communications building and associated earthwork. The project location is shown on the RFP plans.

At the time of this report, the proposed location of the communications building consisted of an open, graded lot with grass cover. The site is relatively flat with less than 2 feet of grade change across the building footprint. The communications building will be a one-story, slab on grade building supported on a shallow, spread footing foundation system.

3.0 Subsurface Investigation

3.1 Field Investigation

The field investigation for this project was completed in October 2022. The investigation included the advancement of one soil boring to a depth of approximately 25 feet below the ground surface.

The boring location was selected by a U.S. Army Corps of Engineers (USACE) Omaha District geotechnical engineer. The location was marked at the site by a USACE Omaha District survey crew. Coordinates and ground surface elevation of the boring are presented in the following table.

Boring Information						
Boring	Latitude	Longitude	Northing ¹	Easting ¹	Depth ²	Elevation ³
GF22-01	47.9591071°	-97.3897720°	365237.380	2730334.829	25.0 ft	903.6 ft

1. United States State Plane Coordinates, US Survey Feet, Zone 3301, North Dakota North.

2. Depth drilled below top of ground surface.

3. Top of boring elevation obtained from survey information. Values have been rounded to one-tenth of a foot.

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February 2023



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The subsurface investigation was performed by a USACE Omaha District drilling crew. The boring was advanced with a Gus Pech 1300 drilling rig utilizing 4.25-inch inside diameter (I.D.) hollow stem augers and a 4-inch center bit. Samples from the boring were taken at depth intervals of approximately 2.5 feet in the upper 10 feet, then approximately every 5 feet for the remainder of the boring.

Representative samples were obtained using disturbed sampling procedures, in which a standard 2-inch O.D. split-barrel sampling spoon was driven into the ground with an automated 140-pound hammer falling a distance of 30 inches. Standard penetration tests (SPTs) were performed during sampling by recording the number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration. The standard penetration resistance values are indicated on the boring logs at the depths of occurrence. The samples were sealed and transported to the laboratory for testing and classification.

3.2 Laboratory Testing

Soil samples obtained from the geotechnical boring were transported to Terracon Consultants, Inc. in Omaha, Nebraska for laboratory testing. The following laboratory tests were performed on selected samples:

- Visual description and identification of soils (ASTM D2488)
- Water content (ASTM D2216)
- Atterberg limits (ASTM D4318)
- Grain size analysis (ASTM D6913)
- pH of soil (ASTM G51)
- Water soluble sulfate in soil (ASTM C1580)
- Electrical conductivity (AWWA 2520)

The soil descriptions presented in this report are in general accordance with the Unified Soil Classification System (USCS) and are based on visual classifications and the results of laboratory testing. The estimated group symbol for the USCS is shown on the boring log sheet in Appendix B. Laboratory test results are located in Appendix C. Chemical testing results are located in Appendix D.

The noted procedural standards are for reference to methodology in general. Variations to methods can be applied as a result of professional judgment.

4.0 Subsurface Conditions

4.1 General Geology

Grand Forks AFB is located within the Agassiz Lake Plain District of the Western Young Drift Section of the Central Lowland Province. Within Grand Forks County, glacial drift, with a maximum thickness of 455 feet, lies above westward-dipping Paleozoic and Mesozoic

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sedimentary rocks. At the project site bedrock is the Ordovician Winnipeg Group consisting of shales, sandstones, and limestones. Topographic relief consists of a variation of only several vertical feet.

4.2 Typical Subsurface Profile

The boring performed for the communications building encountered silty sand, believed to be existing fill, overlying poorly graded sand with variable amounts of silt and gravel. Cohesive (clay) soils were encountered below the poorly graded sand. The sands were generally dense near the surface, becoming medium dense with depth. The sand extended to a depth of approximately 13.5 feet below the ground surface before encountering the cohesive soils. The cohesive soils were generally soft, lean clays with traces amount of silt.

4.3 Groundwater

The borings were observed during and after drilling for the presence and level of groundwater. The following table notes the groundwater and cave-in depths in each boring.

Groundwater and Cave-In Depths ¹				
Boring	Groundwater level immediately after drilling	Groundwater level 24 hours after drilling	Cave-in immediately after drilling	Cave-in 24 hours after drilling
GF22-01	6.5 ft	7.6 ft	8.7 ft	8.9 ft
1. Depth below top of ground surface.				

A relatively long period of time is necessary for a groundwater level to develop and stabilize in a boring. Longer term monitoring in cased holes or piezometers would be required for a more accurate evaluation of the groundwater conditions.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Groundwater levels during construction or at other times in the life of the structures may be higher or lower than the levels indicated in this report. Perched water can also develop overlying dense native clay.

5.0 Preliminary Geotechnical Recommendations

The following is a summary of preliminary geotechnical recommendations for the proposed communications building and associated site/civil work. The information provided is based on the subsurface conditions encountered in the exploratory soil boring performed at the site. Final design recommendations have not been provided.



5.1 Areas of Concern

- **Existing Below-Grade Features:** Existing utility lines associated with previous development are present at the site and may extend through the footprint of the new communications building. Existing utility lines should be rerouted outside of the proposed building footprint, and any abandoned utility lines and subsurface features of existing structures should be completely removed. Poorly compacted backfill is commonly found in utility line trenches and adjacent to existing subsurface structures. Backfill associated with these features should be reworked and recompacted.
- **Existing Fill:** The soils encountered in the upper 3 feet of the boring are likely existing fill. The fill consisted of silty sand with trace amounts gravel. The fill appears to be moderately well-compacted and was likely placed during development of the surrounding structures and pavement. USACE does not have any record of placement or compaction effort of the fill material. Existing fill presents a risk of larger than tolerable and unpredictable settlement due to potential variations in site preparation, composition, and compaction. Removal and replacement or recompaction of the existing fill would reduce the risk posed by the fill; however, further testing and evaluation of the fill may show that it is suitable for support of the proposed communications building.
- **Soft Clay:** Soft clay was encountered in the boring performed for the communications building at a depth of approximately 13.5 feet below the existing ground surface. It is anticipated that the communications building will be lightly loaded and that little to no grade change will occur as a result of construction; therefore, consolidation of the soft clay layer is not anticipated. However, an increase in stress could result in consolidation of this layer and should be considered when evaluating the structural performance of the communications building.

5.2 Foundations

It is anticipated that the new communications building can be supported on a shallow, spread footing foundation system bearing at a design frost depth of 5.5 to 6 feet below final surrounding grade. The bearing conditions across the building footprint are expected to be fairly uniform and consist of medium dense, poorly graded sand at the footing bearing elevation. The net allowable bearing pressure of these soils is expected to be between 1,500 to 2,000 psf without reworking and recompacting. Recompacting the soils to a uniform depth could increase the net allowable bearing pressure, if required. The Contractor's geotechnical engineer shall make recommendations for construction of the foundation system and provide net allowable bearing pressures and other appropriate parameters for design.

5.3 Floor Slabs

It is recommended that floor slabs are underlain by a capillary break of compacted granular material. Additionally, a vapor barrier should be placed beneath the slabs. Removal and replacement of existing fill beneath floor slabs may be necessary per the final recommendations of the Contractor's geotechnical engineer.

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Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

February 2023



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5.4 Earthwork and Construction Considerations

The soils encountered in the borings will be sensitive to disturbance from construction activity and water seepage. Stabilization of haul roads and access drives may be necessary to facilitate construction if site conditions are disturbed by precipitation. Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging and final surrounding grades should provide drainage of surface water away from buildings and pavements. Final surrounding grades should be sloped away from the building exterior for a minimum distance of 10 feet at a slope of not less than 5% for unpaved areas, and not less than 2% for paved areas. Gutters and downspouts that drain water a minimum of 10 feet beyond the footprint of the building are recommended.

6.0 General Notes

The preliminary recommendations presented in this report are based upon the limited data obtained from the subsurface investigation performed at the indicated locations. This report does not reflect variations which may occur across the site or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until an additional subsurface exploration is performed, or during or after construction. The contents of this report should be used for informational purposes only. It is recommended that a complete geotechnical investigation and design recommendations should be provided by the Contractor's geotechnical engineer-of-record prior to design and construction.

Preliminary Geotechnical Engineering Report

Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

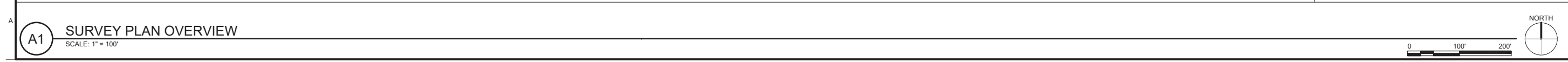
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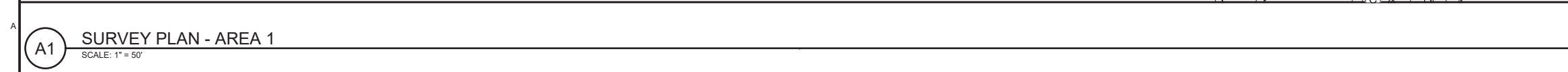


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Appendix A – Boring Location Plan

(Sheets VF100 and VF101 from Drawings)





Preliminary Geotechnical Engineering Report

Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

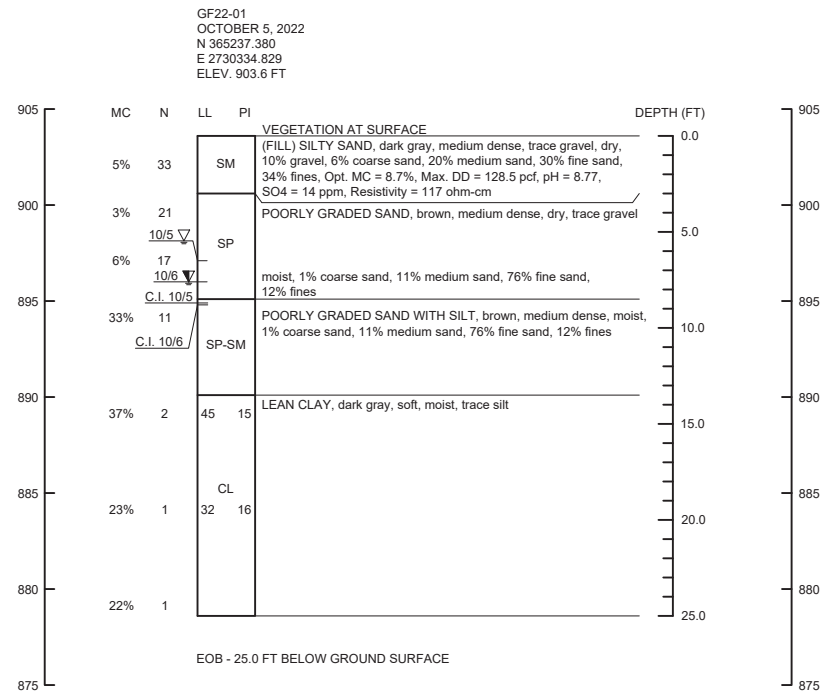
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Appendix B – Boring Logs

(Sheet B-301 from Drawings)



<u>BORING LOG</u>	
GF22-01	BORING NUMBER
OCTOBER 5, 2022	DATE BORING COMPLETED
N 365237.380 E 2730334.829	UNITED STATES STATE PLANE COORDINATES, US SURVEY FEET, ZONE 3301, NORTH DAKOTA NORTH
ELEV. 903.6 FT	TOP OF BORING ELEVATION ROUNDED TO NEAREST TENTH-FOOT (NAVD88)
MC	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D2216)
LL	LIQUID LIMIT
PI	PLASTICITY INDEX
N	STANDARD PENETRATION BLOW COUNT. NUMBER OF BLOWS FOR A 140-POUND WEIGHT DROPPING 30 INCHES TO DRIVE A 2-INCH OUTSIDE DIAMETER SAMPLER 1 FOOT.
% fines	PERCENT OF SOIL BY DRY WEIGHT PASSING THE NO. 200 SIEVE (ASTM D422 / C136)
Opt. MC	OPTIMUM MOISTURE CONTENT FROM MODIFIED PROCTOR COMPACTION TEST (ASTM D1557)
Max. DD	MAXIMUM DRY DENSITY FROM MODIFIED PROCTOR COMPACTION TEST (ASTM D1557)
pH	pH VALUE FROM LAB ANALYSIS (ASTM G51)
SO4	WATER SOLUBLE SULFATE FROM LAB ANALYSIS (ASTM C1580)
ppm	PARTS PER MILLION
Resistivity	SOIL RESISTIVITY FROM LAB ANALYSIS (ASTM G57)
<u>10/5</u> ▾	GROUNDWATER TABLE WHILE DRILLING
<u>10/6</u> ▾	GROUNDWATER TABLE 24 HOURS AFTER DRILLING
<u>C.I. 10/5</u>	BORING CAVE-IN DEPTH AND DATE MEASURED
EOB	END OF BORING

- ## BORING NOTES
1. THE DESCRIPTIONS AT THE RIGHT OF THE LOGS ARE THE RESULTS OF FIELD AND LABORATORY DATA. THE TERMS "DRY," "MOIST," "WET," ETC. ARE FIELD DESCRIPTIONS MADE BY THE GEOLOGIST IN THE FIELD AT THE TIME OF DRILLING. SEE "MC" ON THE CONDENSED LOG OF BORINGS FOR LABORATORY DETERMINATION OF MOISTURE CONTENTS FOR THE SOIL. LABORATORY CLASSIFICATIONS ARE IN ACCORDANCE WITH ASTM D 2487.
 2. THE LOGS FURNISHED REPRESENT THE TYPES OF SOIL ENCOUNTERED AT THEIR RESPECTIVE LOCATIONS AND THE WATER LEVEL ENCOUNTERED AT THAT TIME. THE BORING LOGS ARE CONSIDERED REPRESENTATIVE OF THE SOILS WHICH WERE ENCOUNTERED AT THAT LOCATION; HOWEVER, WATER LEVELS CAN FLUCTUATE APPRECIABLY AT DIFFERENT SEASONS OF THE YEAR OR FROM YEAR TO YEAR DEPENDING LARGELY ON CLIMATIC CONDITIONS. THE CONTRACTOR SHOULD IDENTIFY GROUNDWATER CONDITIONS PRIOR TO THE TIME OF CONSTRUCTION.
 3. FOR SOIL BORING LOCATIONS, SEE SHEETS VF100 AND VF101.
 4. COORDINATE SYSTEM: NORTH DAKOTA NORTH STATE PLANE (3301)
DATUM: NAVD88, NAD83

[illegible]

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Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

February 2023



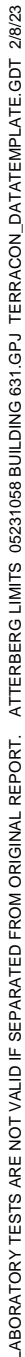
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Appendix C – Laboratory Test Results

Building 631 Soil Testing
Grand Forks AFB, North Dakota
Received January 25 2023
Terracon Project No. 05231058

Boring and Sample Nos.	Depth (ft)	Description	USCS	Sieve % Passing										Atterberg			Moisture Content	Mod Proctor Opt. Moisture	Mod Proctor Max. Density	Required Tests
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#80	#200	LL	PL	PI	%	%	PCF	
OF22-01 D-1	0.5-2.0	2.5Y 5/1 Gray Sandy, Silty Clay															5.4			MC
D-2	3.0-4.5	10YR 7/3 Pale Brown Sand															2.6			MC
D-3	5.5-7.0	2.5Y 6/2 Light Brownish Gray Poorly Graded Sand with Silt	SP-SM				100.0	99.3	96.4	87.9	71.1	21.8	5.9				5.8			MC, MA
D-4	8.5-10.0	10YR 5/3 Brown Silty Sand	SM					100.0	99.6	96.9	88.3	43.8	12.3				33.1			MC, MA
D-5	13.5-15.0	2.5Y 6/1 Gray Silt	ML											45	30	15	36.8			MC, AL
D-6	18.5-20.0	2.5Y 5/1 Gray Sandy Lean Clay	CL											32	16	16	23.1			MC, AL
D-7	23.5-25.0	10YR 4/1 Dark Gray Clay															22.3			MC
B-1	0-3.0	2.5Y 5/2 Grayish Brown Silty Sand	SM	100.0	98.7	96.5	95.4	90.2	83.7	76.3	64.1	41.0	34.3				5.1	8.7	128.5	MC, MA, Modified Proctor, Chem Testing

ASTM D4318

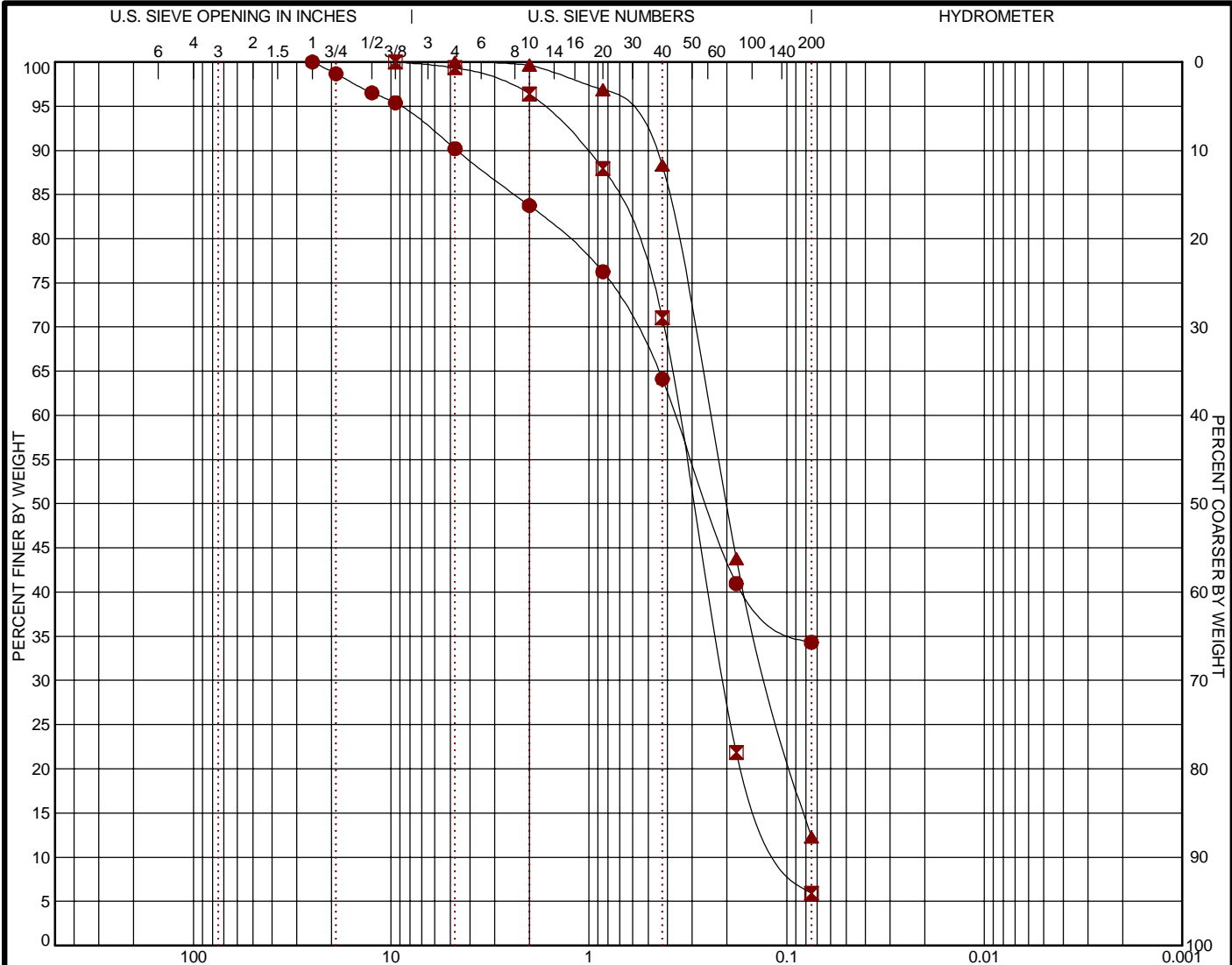


LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 05231058 BUILDING 631.GPJ TERRACON_DATA\TEMPLATE.GDT 2/8/23

EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	coarse	fine	coarse	medium	fine				

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	GF22-01	0 - 3	0.0	9.8	55.9		34.3		SM
⊠	GF22-01	5.5 - 7	0.0	0.7	93.4		5.9		SP-SM
▲	GF22-01	8.5 - 10	0.0	0.0	87.7		12.3		SM

				●		☒		▲		SOIL DESCRIPTION	
				Sieve	% Finer	Sieve	% Finer	Sieve	% Finer	● 2.5Y 5/2 Grayish Brown (SM)	
GRAIN SIZE				1"	100.0	3/8"	100.0	#4	100.0		
				3/4"	98.67	#4	99.34	#10	99.64	☒ 2.5Y 6/2 Light Brownish Gray (SP-SM)	
				1/2"	96.51	#10	96.39	#20	96.88	▲ 10YR 5/3 Brown (SM)	
				3/8"	95.38	#20	87.94	#40	88.31		
				#4	90.18	#40	71.07	#80	43.78		
				#10	83.75	#80	21.82	#200	12.26		
				#20	76.26	#200	5.92				
				#40	64.12						
				#80	40.97						
				#200	34.32						
COEFFICIENTS										REMARKS	
										● Silty Sand	
										☒ Poorly Graded Sand with Silt	
										▲ Silty Sand	

PROJECT: Building 631 Soil Testing

SITE: 344 Tuskegee Airmen Blvd
Grand Forks, North Dakota



15080 A Cir
Omaha, NE

PROJECT NUMBER: 05231058

CLIENT: USACE

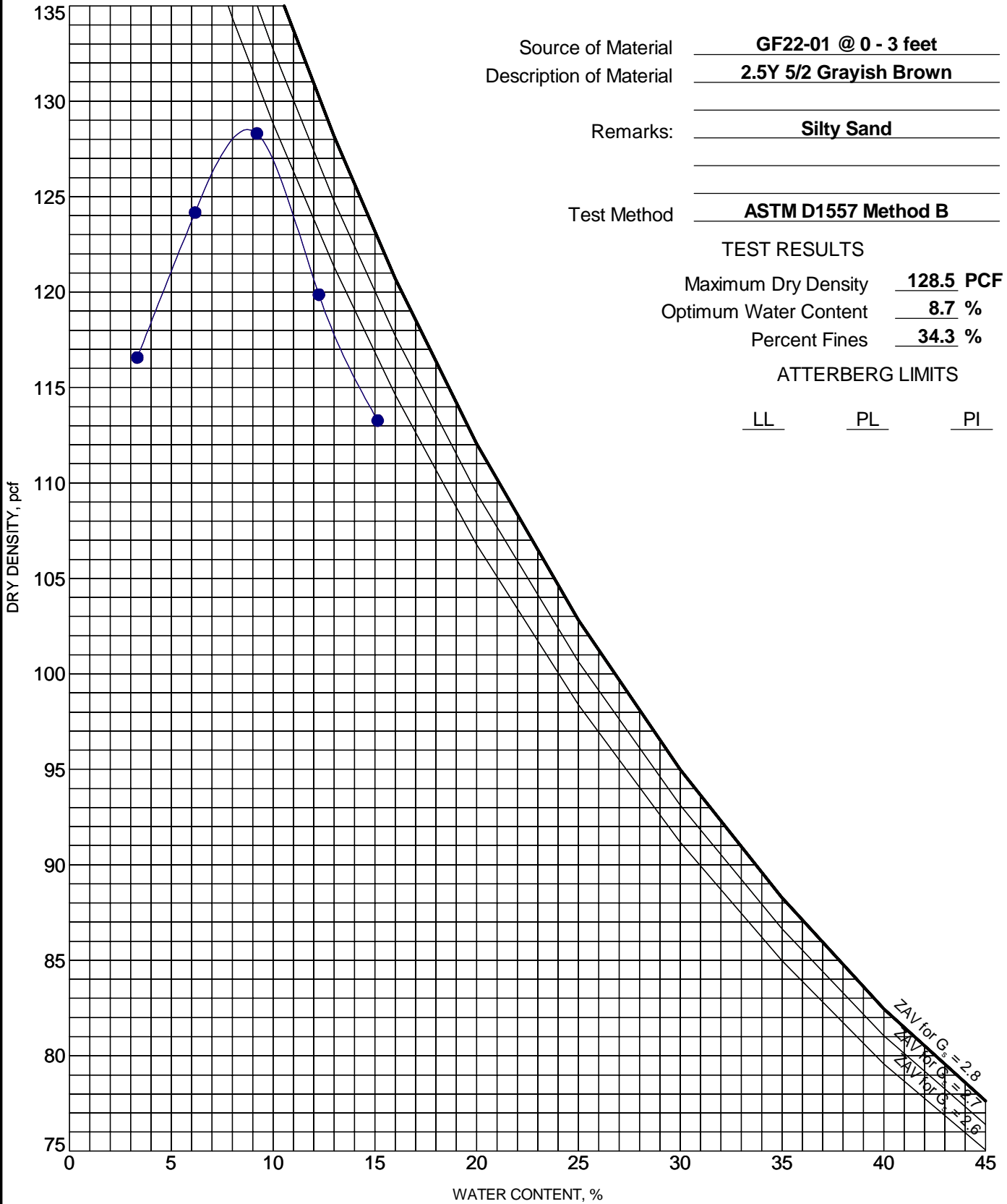
EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 05231058 BUILDING 631.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

MOISTURE-DENSITY RELATIONSHIP

ASTM D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 05231058 BUILDING 631.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23



PROJECT: Building 631 Soil Testing

SITE: 344 Tuskegee Airmen Blvd
Grand Forks, North Dakota



15080 A Cir
Omaha, NE

PROJECT NUMBER: 05231058

CLIENT: USACE

EXHIBIT: B-1

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Disaster Resiliency Program Bldg. 631 | Grand Forks AFB, North Dakota

February 2023



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Appendix D – Chemistry Test Results

General

Soil resistivity, pH, and sulfate tests were performed on one representative sample obtained from the depths indicated in the following table.

Chemistry Results				
Boring	Depth	pH	Sulfate (ppm)	Electrical Conductivity (µS/cm)
GF22-01	0.0 – 3.0 ft	8.77	14	117

Sulfate Risk

Sulfate ion content tests were performed on one representative sample taken from the project site. Sulfate attack is an issue that can be damaging to foundations and concrete pavements. Based on criteria outlined in ACI 201.2, the tested soils pose a low risk of sulfate attack. The sulfate risk classification outlined in ACI 201.2 is presented in the following table.

Sulfate Risk Classification ¹	
Exposure Classification	Sulfate (SO ₄ ²⁻) in water (ppm)
N/A	< 150
Moderate	150 to 1,500
Severe	1,500 to 10,000
Very Severe	> 10,000

1. From ACI 201.2R-16, *Guide to Durable Concrete*, November 2016.

Corrosion Potential

Chemistry testing revealed that the soil was slightly alkaline. Soils having a pH of 8 (alkaline) or above can lead to extreme corrosion rates and premature pitting of metallic objects.



2640 12th Street SW Cedar Rapids, IA 52404

CHEMICAL LABORATORY TEST REPORT

Project Number: 05231058

Report Date: 02/10/2023

Project Name: Building 631 Soil Testing

Client: US Army Corps of Engineers (USACE)

Sample Submitted By: Terracon- Omaha

Lab No.: 06-Cedar Rapids

Results of Corrosivity Analysis

<i>Sample ID:</i>	GF22-01				
<i>Sample Number:</i>	B-1				
<i>Sample Depth (ft.):</i>	0.0' - 3.0'				
Resistivity, ASTM G-57, (ohms-cm)					
pH Determination ASTM G-51	8.77				
Electrical Conductivity, AWWA 2520, (us/cm)	117				
Chlorides, ASTM D-512, (mg/kg)					
Red-OX ASTM G-200 (mV)					
Water Soluble Sulfate, ASTM 1580 (mg/kg)	14				
Sulfides, AWWA 4500-S D, (mg/kg)					

The tests were performed in general accordance with applicable ASTM or AWWA standards. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

Analyzed by: Christalyn Thjorne

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